NOTICE

All drawings located at the end of the document.

ANNUAL UPDATE

FOR AUGUST 1, 1997 THROUGH
AUGUST 1, 1998

HISTORICAL RELEASE REPORT (HRR)

PREPARED BY

ENVIRONMENTAL RESTORATION

ROCKY MOUNTAIN REMEDIATION SERVICES, L.L.C.

RF/RMRS-98-269.UN
REVISION 0

AGENCY ACCEPTANCE FORM
HRR ANNUAL UPDATE

The recommendations of the Department of Energy (DOE) with regard to the need for future actions, or the lack of the need for future actions, are included in each PAC narrative description included in this annual update Any IHSS or PAC for which a decision is deferred will be addressed in future HRR updates

Exceptions to the recommended actions should be noted below or attach comments to this form as needed

_____

_____

_____

_____

Please provide comments and/or acceptance within 30 days from receipt of annual update submittal, or the document will be considered acceptable as is

DOE Signature	CDPHE Signature	EPA Signature
	CDPHE agrees with recommendations CDPHE disagrees with recommendations, see comments	EPA agrees with recommendations EPA disagrees with recommendations, see comments
_____	_____	_____
_____	_____	_____
DOE Concurrence	CDPHE Signature and Position	EPA Signature and Position

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

FIGURES

PHOTOS

TABLES

PLATES

ABBREVIATIONS, ACRONYMS, AND INITIALISMS

ALF	Action Level Framework
AMS	Actinide Migration Study
AOC	Area of Concern
ARA	Accelerated Response Action
CAD/ROD	Corrective Action Decision/Record of Decision
CDPHE	Colorado Department of Public Health and Environment
CEARP	Comprehensive Environmental Assessment & Response Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Ci	Curies
cm	square centimeters
cpm	counts per minute
D&D	Decontamination and Decommission
dpm	disintegrations per minute
DNAPL	dense nonaqueous phase liquid
DOE	U S Department of Energy
EG&G	EG&G Rocky Flats, Inc
EPA	U S Environmental Protection Agency
ERA	Ecological Risk Assessment
ER	Environmental Restoration
FIDLER	Field Instrument for the Detection of Low-Energy Radiation
ft	foot/feet
ft^2	square feet
g	grams
GPS	Global Positioning System
HDPE	High Density Polyethylene
HI	Hazard Index
HEPA	High Efficiency Particulate Air
HHRA	Human Health Risk Assessment
HPGe	High Purity Germanium
HRR	Historical Release Report
IHSS	Individual Hazardous Substance Site
IAG	Interagency Agreement
IM/IRA	Interim Measure/Interim Remedial Action
IMP	Integrated Monitoring Program
ITS	Interceptor Trench System
ITPH	Interceptor Trench Pump House
IWCP	Integrated Work Control Package
µCi/g	microcuries per gram
µg/Kg	micrograms per kilogram (ppb)
µg/L	micrograms per liter (ppb)
mg/Kg	milligrams per kilogram (ppm)
mg/L	milligrams per liter (ppm)
MDL	Method Detection Limit

ABBREVIATIONS, ACRONYMS, AND INITIALISMS
(continued)

MST	Modular Storage Tank
nCi/g	nanocuries per gram
NFA	No Further Action
NTS	Nevada Test Site
OPWL	Original Process Waste Lines
OU	Operable Unit
PA	Protected Area
PAC	Potential Area of Concern
PAM	Proposed Action Memorandum
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
pCi/g	picocuries per gram
POC	Point of Compliance
POE	Point of Evaluation
ppb	part per billion (µg/Kg or µg/L)
ppm	part per million (mg/Kg or mg/L)
PPRG	Programmatic Preliminary Remediation Goal
PSZ	Perimeter Security Zone
PU&D	Property Utilization and Disposal
RCRA	Resource Conservation and Recovery Act
RCRA 3004(u)	Appendix 1, Waste Management Units RCRA Part B Permit Application
RFCA	Rocky Flats Cleanup Agreement
RFFO	Rocky Flats Field Office
RFETS	Rocky Flats Environmental Technology Site
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RFP	Rocky Flats Plant
RI	Remedial Investigation
RMRS	Rocky Mountain Remediation Services, L L C
SEP	Solar Evaporation Pond
SID	South Interceptor Ditch
SITE	Superfund Innovative Technology Evaluation
SNM	Special Nuclear Material
STP	Sewage Treatment Plant
SVOC	Semivolatile Organic Compound
SWD	Soil Water Database
SWMU	Solid Waste Management Unit
TCA	1,1,1-trichloroethane
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TSCA	Toxic Substances Control Act
UBC	Under Building Contamination
UIS	Unit Information Sheet
VOC	Volatile Organic Compound

ABBREVIATIONS, ACRONYMS, AND INITIALISMS
(continued)

WY	Water Year
yd^3	cubic yards

SECTION 1.0
INTRODUCTION

1.0 INTRODUCTION

Background

The Rocky Flats Environmental Technology Site (RFETS) began operation in 1951 Since 1951, materials defined as hazardous substances, pollutants, and contaminants by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and materials defined as hazardous waste and hazardous constituents by the Resource Conservation and Recovery Act (RCRA) and/or the Colorado Hazardous Waste Act (CHWA), have been produced, purchased, disposed, and released at various locations at RFETS Certain contaminants have been detected and remain in groundwater, sediments, surface water and soils at the Site and thus pose potential human health and environmental risks

RCRA regulations require that all Solid Waste Management Units (SWMUs) be identified This became applicable to RFETS with the signing of a Compliance Agreement, on July 31, 1986 At that time, the exact definition of a SWMU had not been formalized Therefore, RFETS used guidance from the State of Colorado and the regional office of the U S Environmental Protection Agency (EPA) The State of Colorado and the EPA required the identification of all areas where environmental releases may have occurred including hazardous waste and non-hazardous waste-related releases Also included were single-release areas and long-term management areas where waste storage may have occurred

SWMUs were initially identified in 1985 by the Los Alamos operations office and presented in the Draft Comprehensive Environmental Assessment and Response Program (CEARP) Phase I Installation Assessment The study consisted of a records search, an open literature survey, and interviews with RFETS employees SWMUs consisted of inactive waste disposal sites, accidentally contaminated sites, and sites found to pose environmental concern due to past or current waste management practices Inspections were conducted on each site The first identification of RFETS SWMUs, consistent with the guidance provided by the State of Colorado and the regional EPA, was presented as an appendix to the November 1986 RCRA Part B Permit Application

Formal efforts to document the extent of Site contamination were established with the signing of the Interagency Agreement (IAG) in 1991 At that time, SWMUs at RFETS were re-named as Individual Hazardous Substance Sites (IHSSs) IHSS is a term defined in the IAG (Section 3 2 8) as " locations associated with a release or threat of release of hazardous substances which may cause harm to human health/or the environment " The term IHSS is commonly used today The IAG grouped IHSSs into 16, larger Operable Units (OUs) by similar contaminant or geographical location and schedules were set for further characterization

In accordance with the IAG, a Historical Release Report (HRR) was developed The original intent of the HRR was to capture existing information on historical incidents and plant practices involving hazardous substances at RFETS Additionally, the IAG prescribed that the HRR reporting process continue quarterly for reporting of new or newly identified releases of hazardous substances to the environment (now identified as Potential Areas of Concern or PACs)

In 1996, the Rocky Flats Cleanup Agreement (RFCA) was signed incorporating the earlier IAG requirements for updating the HRR RFCA requires the HRR to be updated annually The first Annual Update was submitted in September 1996

RFCA also consolidated the 16 OUs designated in the IAG into 7 OUs to reduce process and administrative requirements The OUs resulting from the consolidation are as follows

OU 1,
OU 3,
OU 5,
OU 6,
OU 7,
Buffer Zone OU, and
Industrial Area OU

At that time CAD/RODs for OUs 11, 15, and 16 were already complete and OUs 1, 3, 5, 6, and 7 were nearing completion. For this reason these OUs retained their IAG designations The Buffer Zone OU incorporates all IHSSs from OU 2, IHSSs 170, 174A, and 174B from the former OU 10, and, all PACs within those IHSSs and the Buffer Zone The Industrial Area OU incorporates all IHSSs from OUs 4, 8, 9, 12, 13, 14, IHSSs 115 and 196 from OU 6, all IHSSs from OU 10 with the exception of 170, 174A, and 174B, and all PACs within those IHSSs and the Industrial Area

Organization of this Annual Update to the HRR

This Annual Update to the HRR provides a variety of information pertaining to spills, releases, or findings of contaminants at RFETS during the reporting period for August 1, 1997 through August 1, 1998 A large portion of the text specifically addresses new information gathered to update older IHSS(s) or PAC descriptions This annual update is prepared in accordance with Part 9, Subpart B, Section 119 of RFCA (DOE, 1996), which requires notification of spills, releases, or findings in a format consistent with the original HRR. The format includes

- An assigned PAC Reference Number
- IHSS Number (if applicable)
- Unit Name
- Approximate Location
- Date(s) of Operation or Occurrence
- Description of Operation or Occurrence
- Physical/Chemical Description of Occurrence
- Fate of Constituents Released to the Environment
- Action/No Further Action Recommendation
- Comments
- References

For purposes of the HRR process and mapping clarity, original IHSS locations where designated a unique "PAC Area" prefix number based upon geographic location An area where there has been a recent release or finding of a hazardous substance to the environment (i e , since 1992) is also assigned a PAC area prefix number followed by the next numerically highest release number for that area These areas are referred to as PACs and are similar to IHSSs in that they are CERCLA sites requiring disposition through the HRR and CERCLA reporting process

PAC prefixes are selected according to 14 geographical subdivisions as illustrated on Figure 1-1 Large PAC areas (i e , PACs which cross geographic PAC boundaries) such as the Original Process Waste Lines (OPWL) (PAC #000-121) and the Central Avenue Waste Spill (PAC #000-172) have been assigned a 000 prefix for clarification This Annual Update contains two "new" PAC locations in the 700 Area and hence, are sequentially assigned numbers PAC Area 700-1116 and PAC Area 700-1117

In addition to the 14 geographic areas, potential Under Building Contamination (UBC) sites were also discussed in the original HRR (DOE, 1992) UBC areas were necessary due to the potential contamination of soil and/or groundwater identified or suspected under specific buildings from broken process waste lines or other sources Plate #4, Potential Areas of Concern, illustrates the UBC locations identified at RFETS

PAC narratives include Department of Energy (DOE) Rocky Flats Field Office (RFFO) recommendations for further action or No Further Action (NFA) warranted These recommendations are based on process knowledge, analytical data, conservative risk-based screens, or formally conducted personal interviews The Agency Acceptance Form, included as the second page of this document, will continue to be incorporated into the annual reporting process Signatures on this form document regulatory agency concurrence or non-concurrence with DOE, RFFO recommendations

Section 1.0 (this section) provides the evolutionary history of the HRR and describes the content for this document Beginning in this update, a tracking table shows the current status for all CERCLA sites at RFETS (IHSSs, PACs, UBCs etc) The status table, located at the end of this Section, is an up-to-date account of the number of Source Removal actions performed (total), the number of IHSSs and PACs officially closed out either by written direction from the regulatory agencies or through the Corrective Action Decision/Record of Decision (CAD/ROD) process, the number of IHSSs and PACs "proposed" for NFA since the 1992 HRR, and finally, the number of total CERCLA sites warranting further research and/or investigation

Section 2.0 presents newly identified PACs identified due to releases, spills (or findings) to the environment during the reporting period from August 1, 1997, through August 1, 1998 New PACs are defined as newly identified or suspected releases for which DOE, RFFO has notified the Environmental Protection Agency (EPA) and Colorado Department of Public Health and the Environment (CDPHE) Section 2 will also identify and map any locations where potentially RCRA hazardous soil below 10^{-6} health risk has been placed back into an excavation as a result of a non-RFCA generation process such as repair of a waterline, etc This type of activity occurred

for one area where soils were approved for put-back by the regulatory agencies (see PAC 700-1117)

Section 3.0 provides PAC revisions and incorporates new information regarding previously designated IHSSs and/or PACs The revised narratives include

- Additional information or findings related to previously designated CERCLA sites such as new data, boundary changes, corrections identified, etc ,
- Proposed NFA status based upon process knowledge, analytical data, conservative risk-based screening, source removal (or approved treatment) of contaminants in accordance with Agency approved Proposed Action Memorandums (PAMs), Interim Measure/Interim Remedial Action (IM/IRA), or other authorizing documentation,
- Approved NFA status based upon final CAD/ROD acceptance or other authorizing documentation, and,
- Accelerated actions taken within the Environmental Restoration (ER) framework of field activities

Section 4.0 briefly describes events that occurred at Rocky Flats during the reporting period which are considered significant and should be documented The HRR annual updating process is an appropriate format for documenting such events that may be useful in the future

Maps included in this update have been reviewed for accuracy and compared to information compiled and documented during the investigation processes The RFCA Consolidated Operable Unit map submitted with RFCA and the original HRR PAC Area format was combined and is illustrated as Plate #1 Plate #1 only illustrates IHSSs for which further investigation or action is warranted NFA and Proposed NFA IHSSs and PACs are illustrated on a separate coverage (Plate #2) thereby easily delineating between the IHSSs which require further action and progress made toward site cleanup In addition, due to the complex nature of the OPWL and associated IHSSs, an additional map (Plate #3) illustrates the OPWL system as a stand-alone area requiring further investigation The PAC and UBC map (Plate #4) is consistent with past HRR Update Reports and shows PACs/UBCs which require further action.

Table 1, located at the end of this document, provides a list of all CERCLA sites identified in the original HRR, quarterly updates, and annual updates A cross-reference with IHSS number (if applicable), IHSS numbers for PACs occurring within an IHSS boundary, and OU designation is provided in accordance with RFCA. Additionally, Table 1 provides a reference to quarterly or annual reports updating the information provided in the original PAC identification. Designation of a PAC as Proposed NFA or Approved NFA is also provided along with the reference to the quarterly or annual report the designation was assigned New PACs and PAC or IHSS revisions inclusive to this annual report are highlighted on Table 1

Summary

In summary, this report is intended to provide a comprehensive compilation of historical information updated to reflect present conditions and response actions at the RFETS with regard to environmental releases or significant events It is not the intention for this annual update or past updates to change or amend researched information in the original HRR but rather to provide additional facts for specific areas as they become available Prior to initiating work within PACs or IHSSs, more specific information such as regulatory agreements, analytical data, Work Plans, Technical Memorandums, Data Summary Reports, PAMs, Accelerated Action Completion Reports, etc , should be reviewed

For information regarding groundwater contaminant plumes and surface water monitoring at RFETS, refer to the Annual RFCA Groundwater Monitoring Reports and the Interim Measures/Interim Remedial Actions for the Industrial Area annual report(s)

CERCLA Site Tracking and Status Through August 31, 1998[1]

Source Removal Actions	**27**
Official Closures through CAD/ROD Process (or other approval)	**64**
CAD/ROD Specifies Deferral Action for IHSS Until D&D	**5**
Proposed No Further Actions	**129**
Further Action Warranted	**153**
Total	**346**

[1] CERCLA Site(s) include IHSSs, PACs, and UBCs at RFETS

SECTION 2.0

NEW PAC NARRATIVES

(PACS IDENTIFIED FROM AUGUST 1, 1997 THROUGH AUGUST 1, 1998)

PAC REFERENCE NUMBER: 700-1116

IHSS Reference Number	700-150 7, Industrial Area Operable Unit
Unit Name	Leaking Transformer South of Bldg 776
Occurrence Report #	N/A
Approximate Location	N750,000, E2,084,000

Date(s) of Operation or Occurrence

January 19, 1998

Description of Operation or Occurrence

On January 19, 1998, while conducting a surveillance audit in the 700 Building Area, it was discovered that Transformer T-776-2 was leaking small amounts of dielectric fluid from a weep hole near the bushing/seal area. Additionally, staining of the concrete transformer pad along with some of the adjacent rock/soil surrounding the pad was observed (Radian, 1998) The age of the release to surrounding pad and adjacent soil/rock appears consistent with other transformer releases reported in the HRR (DOE, 1992) It is believed that the transformer and stained soil was inadvertently excluded from the Preliminary Assessment/Site Assessment of Polychlorinated Biphenyls (PCBs) Site study (EG&G, 1991)

The transformer went into service in April of 1957 (RMRS, 1998) and is located within IHSS 150 7 At present, it is unclear if the transformer underwent retro-filling in the late 1980s or at what other locations the transformer may have been used

Physical/Chemical Description of Constituents Released

The dielectric oil in Transformer T-776-2 was sampled in July 1995 and February 1992 The results are summarized in a data report prepared for EG&G in 1992 and show Aroclor 1260 at 23 parts per million (ppm) (RMRS, 1998) Another reference to earlier sampling of the oil was found in the Routine Maintenance Equipment Record for Transformer 776-2 (RMRS, 1998) indicating PCB concentrations at 21 ppm Neither document references the method used and there is no evidence that leaks were detected or soils were sampled

Response to Operation or Occurrence

On January 19, 1998, upon discovery of the dielectric oil escaping from the transformer and stained rock/soil, building management reported the occurrence to the spill response coordinator (Radian, 1998) The analyses noted above were located and evaluated to assess the nature of the release It was determined that the staining on the rock/soil was characteristic of an old release

which had occurred over many years According to the Routine Maintenance Record, the oil leak from Transformer T-776-2 was repaired on March 30, 1998 (RMRS, 1998)

Fate of Constituents Released to the Environment

Visual inspection of the rock/soil area adjacent to the transformer pad confirms that an undetermined amount of dielectric oil has been released to the environment An estimate of 2 gallons was made in the Environmental Occurrence Log (Radian, 1998), however, it is unclear how long the transformer had been leaking Also, it is unclear as to whether the bermed area surrounding the transformer has a concrete floor Existing data from two sampling events indicate that the dielectric oil contains between 21 ppm (1985) and 23 ppm (1992) Aroclor 1260 The transformer was placed into service in 1957 which was a time when PCB Aroclors where common among most dielectric cooling oils at Rocky Flats There has been no sampling of the stained rock/soil adjacent to the transformer pad since the occurrence was reported in January of 1998

Action/No Further Action Recommendation

The fate of constituents and associated risk to human health and the environment from this release is considered minimal because of the small size of the rock/soil stained area and estimated volume of the release (i e , 2 gallons). However, the analytical results from the previous sampling of the dielectric oil indicate that the PCB concentrations in the oil (23 ppm maximum) is close to the cleanup threshold established for the source removal of other similar PCB transformer sites (i.e , 25 ppm) (DOE, 1995, DOE, 1996, DOE, 1997). Further investigation is warranted because of the lack of soil data to characterize the potential PCB contamination in the adjacent rock/soil.

Comments

PAC 700-1116 is within PAC 700-150 7 (IHSS 150 7) and has been added to Plate #4 of this report

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1995, *Final Proposed Action Memorandum for Remediation of Polychlorinated Biphenyls*, RF/ER-95-0066 UN, Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1997, *Closeout Report for the Source Removal of PCBs* RF/RMRS-97-044 Rev 0, Rocky Flats Environmental Technology Site, Golden, CO, July

EG&G, 1991, *Assessment of Known, Suspect, and Potential Environmental Releases of Polychlorinated Biphenyls (PCBs), Preliminary Assessment/Site Description,* Rocky Flats Environmental Technology Site, Golden, CO, October

Radian, 1998, *Environmental Occurrence Log*, Rocky Flats Environmental Technology Site, Golden, CO, January

RMRS, 1998, *Environmental Operations CERCLA History Files*, Rocky Flats Environmental Technology Site, Golden, CO, July

PAC REFERENCE NUMBER: 700-1117

IHSS Reference Number	Not Applicable, Industrial Area Operable Unit
Unit Name	Building 701 Water Line Soil Put-back
Approximate Location	N750,703, E2,083,751

Date(s) of Operation or Occurrence

October 9, 1997

Description of Operation or Occurrence

On October 9, 1997, Building 776 management reported that water was surfacing at an area immediately south of Building 701 Upon further investigation, it was suspected that the Building 776 cooling tower return line was the source of the water and a work order was submitted for excavation and repair The line was located and repaired, however, due to the urgency of the work, sampling for the required RCRA hazardous waste determination was done after the excavation spoils were generated In the interim, the spoils (approximately five cubic yards [yd^3]) were protected from the elements utilizing heavy plastic with bermed containment and a tarp cover (RMRS, 1998)

A sampling plan was generated consistent with methods described in R.O Gilbert (1987) and approved in late November 1997 (Tenera, 1997) Ten sampling locations were selected Samples were collected in January and analyzed for EPA SW-846 Volatile Organic Compounds (VOCs), SW-846 Total Metals, and isotopic radionuclides Upon receipt of the analytical data in February 1998, the excavation spoils were held outside the excavation because 100 part per billion (ppb) carbon tetrachloride was detected in one sample (RMRS, 1998) The decision is consistent with plant practice under existing Site procedures for non-RFCA related construction/maintenance activities Due to the low detection of carbon tetrachloride (100 ppb) and permissible put-back levels approved for RFCA environmental projects (230 ppb), it was decided to seek approval from the regulatory agencies for Site specific soil put-back at this location (DOE, 1998)

Physical/Chemical Description of Constituents Released to Environment

Analytical data for samples collected in January 1998 show carbon tetrachloride at 100 ppb and chloroform at 63 ppb from one sampling location Chloroform is commonly detected in this range due to the addition of chlorine for domestic water use There were no metals detected above background, however, plutonium-239/240 was detected at 10 4 pCi/g and americium-241 at 2 29 pCi/g Both isotopic results are above background levels and are likely attributable to the 1969 fire associated with Building 776 (DOE, 1992)

Response to Occurrence

The work request was issued on October 9, 1997 and was accompanied by an Integrated Work Control Plan (IWCP) An Environmental Assessment was conducted as part of the Soil Disturbance Permit and sampling requirements were called out due to the close proximity of the occurrence to IHSSs 118 1, 121 and 131 (RMRS, 1997) Work to repair the line proceeded on December 17, 1997 and the line was repaired several days later The excavation spoils were sampled on January 26, 1998 and results were received in February 1998 Approval to replace the spoils into the excavation from the regulatory agencies was granted on July 8, 1998 (CDPHE, 1998) The excavation was backfilled on August 12, 1998 (RMRS, 1998)

Fate of Constituents Released to the Environment

On January 12, 1998, the CDPHE stated that for a "defacto" delisting determination of soils containing listed wastes, the State has used 10^{-6} health risk-based numbers for direct contact by a resident At these levels, the soils lose their listed waste label and are eligible to be placed back into their excavation without having to be further managed Specific values provided in the above-referenced letter were selected from Table 1 – Soil Cleanup Table Value Standards in the CDPHE's Soil Remediation Objectives The carbon tetrachloride value in the standard is 230 ppb (DOE, 1998)

Action/No Further Action Recommendation

The DOE was granted permission on July 8, 1998 to apply the values in the Soil Cleanup Table Value Standards from the CDPHE's Soil Remediation Objectives to the soils generated from this specific project (CDPHE, 1998) In addition, it was agreed that the RFCA Tier II radionuclide action levels could be applied as put-back levels for the plutonium and americium (DOE, 1996) Based on these agreements, the spoils were returned to the site on August 12, 1998 and further action is not required

Comments

Carbon tetrachloride releases are known to have occurred in this area (see PAC 700-118 1) It has not been determined if this occurrence is related

For tracking purposes, the location of this excavation and subsequent soil put-back has been assigned a PAC number and is identified on Plate 2 (Proposed No Further Action sites) as well as the site-specific map (Figure 2-1) following this write-up

The analytical data associated with this project are located in the Soil Water Database (SWD)

References

CDPHE, 1998, *Excavated Soil Adjacent to Building 701 (cc mail from C Spreng to L. Brooks),* Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1992, *Historical Release Report for the Rocky Flats Plant,* Rocky Flats Plant, Golden, CO, June

DOE, 1996, *Final Rocky Flats Cleanup Agreement,* Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1998, Request to Apply Soil Cleanup Table Value Standards in CDPHE Soil Remediation Objectives to Building 701 Spoils, 98-DOE-03757, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, June

RMRS, 1997, *Soil Disturbance Permit for Building 701 Water Leak, NB1970CM,* Rocky Flats Environmental Technology Site, Golden, CO, October

RMRS, 1998, *Environmental Operations CERCLA History Files,* Rocky Flats Environmental Technology Site, Golden, CO, July

Tenera, 1997, Recommended Sampling Approach for Characterization and Return of Soil Excavated Near Building 559/701 Due to Water Main Repairs, Rocky Flats Environmental Technology Site, Golden, CO, November

SECTION 3.0

REVISED PAC NARRATIVES

PAC REFERENCE NUMBER: NE-1404

IHSS Reference Number	142 6, Operable Unit 6
Unit Name	Diesel Spill at Pond B-2 Spillway
Approximate Location	N750,500, E2,087,000

Date(s) of Operation or Occurrence

October 27, 1992

Description of Operation or Occurrence

A release of approximately 18 gallons of diesel fuel, resulting from a leak in the fuel tank of a portable pump used to transfer water from Pond B-2 to Pond A-2, was reported on October 27, 1992 (DOE, 1993)

Physical/Chemical Description of Constituents Released

The constituent released was diesel fuel (DOE, 1993) Cleanup materials from diesel spills are managed as Resource Conservation and Recovery Act (RCRA)-regulated waste pending analytical results because the material potentially contains benzene in excess of the Toxicity Characteristic Leaching Procedure (TCLP) limit Samples collected from the soil affected by the release were analyzed for TCLP volatiles and gross alpha/beta The analytical data (attached) for TCLP analysis show that the soil affected by the release is not RCRA hazardous (DOE, 1993)

Responses to Operation or Occurrence

A containment dike was built around the pump to prevent residual fuel from entering the pond Absorbent booms were pulled across Pond B-2 from west to east to absorb the fuel released Absorbent pillows were also used Additional booms and absorbent pads were placed on the pond until a second drag was completed The pump was taken out of service for repair An estimated 200 pounds of material (soil and absorbent booms) were recovered from the spill area, containerized, and managed in a RCRA 90-day accumulation area pending analytical data The data were received on October 29, 1992 (DOE, 1993) The used absorbent booms and pillows were placed in 55-gallon drums Approximately 1 ½ yd^3 of fuel-contaminated soil was removed from the spill site and placed in a half-crate plywood box (EG&G, 1992)

Fate of Constituents Released to Environment

The spill and spill area were cleaned up until no visual evidence of contamination was present The pond area was monitored by visual examination for the presence of a "sheen" for one week after the spill Additional contamination was not detected upon the visual examination Soil

removed from the spill area was analyzed for TCLP volatiles for waste dispositioning purposes VOCs were not detected in the extract (EG&G, 1992)

Action/No Further Action Recommendation

Based on the nature of the release and response to the occurrence, a residual source of contamination associated with PAC NW-1404 is not likely The spill and spill area were cleaned up and, as a result, a contaminant source for PAC NW-1404 does not exist Therefore, this PAC is proposed as NFA. The recommendation for NFA is consistent with the criteria for recommending NFA decisions presented in RFCA (DOE, 1996)

Comments

PAC NE-1404 overlaps with IHSS 142 6 (PAC NE-142 6) IHSS 142 6 was proposed as NFA in the 1997 Annual Update to the HRR (DOE, 1997)

There was no release to RFETS waters downstream due to the isolation of Pond B-2 water from the normal B-Series drainage

References

DOE, 1993, *Quarterly Update from January 1, 1993 to April 1, 1993 Historical Release Report*, 93-RF-5296, Rocky Flats Environmental Technology Site, Golden, CO, April.

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1997, *Annual Update for the Historical Release Report*, RF/RMRS-97-073 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

EG&G, 1992, Critique Meeting Minutes, October 28, 1992

PAC - 1-04

IA

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO

00502

Lab Name. GLAB Contract

Lab Code CLAB Case No SAS No 92X0 SDG No

Matrix. (soil/water) WATER Lab Sample ID B-2 SOIL

Sample wt/vol 5 (g/mL) ML Lab File ID OCT2902

Level. (low/med) LOW Date Received. 10/29/92

% Moisture: not dec.100 Date Analyzed. 10/29/92

Column: (pack/cap) CAP Dilution Factor. 10.00

CAS NO.	COMPOUND	CONCENTRATION UNITS. (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	100.	U
74-83-9	Bromomethane	100.	U
75-01-4	Vinyl Chloride	100.	U
75-00-3	Chloroethane	100.	U
75-09-2	Methylene Chloride	50.	U
67-64-1	Acetone	100.	U
75-15-0	Carbon Disulfide	50.	U
75-35-4	1,1-Dichloroethene	50.	U
75-34-3	1,1-Dichloroethane	50.	U
540-59-0	1,2-Dichloroethene (total)	50.	U
67-66-3	Chloroform	50.	U
107-06-2	1,2-Dichloroethane	50.	U
78-93-3	2-Butanone	100.	U
71-55-6	1,1,1-Trichloroethane	50.	U
56-23-5	Carbon Tetrachloride	50.	U
75-27-4	Bromodichloromethane	50.	U
78-87-5	1,2-Dichloropropane	50.	U
10061-01-5	cis-1,3-Dichloropropene	50.	U
79-01-6	Trichloroethene	50.	U
124-48-1	Dibromochloromethane	50.	U
79-00-5	1,1,2-Trichloroethane	50.	U
71-43-2	Benzene	50.	U
10061-02-6	trans-1,3-Dichloropropene	50.	U
75-25-2	Bromoform	50.	U
108-10-1	4-Methyl-2-Pentanone	50.	U
591-78-6	2-Hexanone	50.	U
127-18-4	Tetrachloroethene	50.	U
79-34-5	1,1,2,2-Tetrachloroethane	50.	U
108-88-3	Toluene	31.	J
108-90-7	Chlorobenzene	50	U
100-41-4	Ethylbenzene	21.	J
100-42-5	Styrene	50.	U
1330-20-7	Xylenes (total)	120.	

PAC REFERENCE NUMBER: NE-1405

IHSS Reference Number	NA, Buffer Zone Operable Unit
Unit Name	Diesel Fuel Spill at Field Treatability Unit
Approximate Location	N750,500, E2,087,500

Date(s) of Operation or Occurrence

January 14, 1993

Description of Operation or Occurrence

A release of approximately 20 gallons of diesel fuel resulted from overfilling a diesel fuel tank that supplied a portable generator for the OU 2 Treatment Facility The release was reported at 9 00 a m on January 14, 1993 The spill was cleaned up with absorbent material and later excavated until no visual evidence of fuel was present (DOE, 1993)

Physical/Chemical Description of Constituents Released

The constituent released was diesel fuel (DOE, 1993) Cleanup materials from diesel spills are managed as RCRA-regulated waste pending analytical results because the material potentially contains benzene in excess of the TCLP limit Samples collected from the fuel and excavated soil were analyzed for TCLP volatiles and radioactivity The analytical data (attached) show that the soils affected by the release are not RCRA-hazardous and radioactivity is below background (DOE, 1993)

Responses to Operation or Occurrence

Prior to excavation of soils in the spill area, sampling was conducted for waste dispositioning purposes The soil was then excavated until no visual evidence of contamination was present Seventeen drums were filled with soil and road base was placed in the excavation (DOE, 1993)

Fate of Constituents Released to Environment

The spill and spill area were cleaned up until no visual evidence of contamination was present Based on the response, residual contamination to the environment would not be anticipated Soil removed from the spill area was analyzed for VOCs (DOE, 1993) All compounds detected were below RFCA action levels

Action/No Further Action Recommendation

Based on the response to the occurrence, a residual source of contamination associated with PAC NW-1405 is not likely The spill and spill area were cleaned up and, as a result, a contaminant source for PAC NW-1405 does not exist Therefore, this PAC is proposed as NFA The recommendation for NFA is consistent with the criteria for recommending NFA decisions presented in RFCA (DOE, 1996)

Comments

None

References

DOE, 1993, *Quarterly Update from January 1, 1993 to April 1, 1993 Historical Release Report*, 93-RF-5296, Rocky Flats Environmental Technology Site, Golden, CO, April

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO

00103

Lab Name GLAB Contract

Lab Code GLAB Case No SAS No 93X0 SDG No

Matrix (soil/water) SOIL Lab Sample ID PURE FUEL

Sample wt/vol 1 (g/mL) G Lab File ID JAN2201

Level (low/med) MED Date Received 1/14/92

Moisture not dec 0 Date Analyzed 1/22/93

Column (pack/cap) CAP Dilution Factor 10 00

CAS NO	COMPOUND	CONCENTRATION UNITS (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	500	U
74-83-9	Bromomethane	500	U
75-01-4	Vinyl Chloride	500	U
75-00-3	Chloroethane	500	U
75-09-2	Methylene Chloride	89	BJ
67-64-1	Acetone	500	U
75-15-0	Carbon Disulfide	250	U
75-35-4	1,1-Dichloroethene	250	U
75-34-3	1,1-Dichloroethane	250	U
540-59-0	1,2-Dichloroethene (total)	250	U
67-66-3	Chloroform	250	U
107-06-2	1,2-Dichloroethane	250	U
78-93-3	2-Butanone	500	U
71-55-6	1,1,1-Trichloroethane	250	U
56-23-5	Carbon Tetrachloride	250	U
75-27-4	Bromodichloromethane	250	U
78-87-5	1,2-Dichloropropane	250	U
10061-01-5	cis-1,3-Dichloropropene	250	U
79-01-6	Trichloroethene	250	U
124-48-1	Dibromochloromethane	250	U
79-00-5	1,1,2-Trichloroethane	250	U
71-43-2	Benzene	33	J
10061-02-6	trans-1,3-Dichloropropene	250	U
75-25-2	Bromoform	250	U
108-10-1	4-Methyl-2-Pentanone	500	U
591-78-6	2-Hexanone	500	U
127-18-4	Tetrachloroethene	250	U
79-34-5	1,1,2,2-Tetrachloroethane	250	U
108-88-3	Toluene	320	
108-90-7	Chlorobenzene	250	U
100-41-4	Ethylbenzene	380	
100-42-5	Styrene	250	U
108-38-3	Xylenes (total)	450	
60-29-7	Ethyl Ether	250	U
75-69-4	Trichlorofluoromethane	250	U
76-13-1	Trich-triflethane	250	U
141-78-6	Ethyl Acetate	250	U
95-47-6	o-Xylene	470	

PAC REFERENCE NUMBER: NE-1406

IHSS Number	NA, Buffer Zone Operable Unit
Unit Name	771 Hillside Sludge
Approximate Location	N752,000, E2,084,600

Date(s) of Operation or Occurrence

Unknown The possibility of waste disposal in a previously undisclosed location was identified in June 1992 (DOE, 1993)

Description of Operation or Occurrence

During excavation activities for construction of a groundwater storage system referred to as the Modular Storage Tanks, an 80 by 80 ft zone of odiferous and dark-colored soil was identified This soil appeared to be highly organic in nature and characteristically similar to sanitary wastewater treatment plant sludge disposed in other locations on Site, however, review of aerial photographs for the area did not indicate any such activity occurring in this location (DOE, 1993, EG&G, 1994)

Physical/Chemical Description of Constituent Released

Based on previous observations of similar material, it was assumed that the material identified was sludge from the sanitary wastewater treatment plant (DOE, 1993) The sludge was expected to be similar to other sanitary wastewater treatment plant sludges, however, the possibility of contamination by other constituents was considered (DOE, 1993)

Responses to Operation or Occurrence

The area was surveyed for radioactivity and VOCs and access to the area was restricted (DOE, 1993, EG&G 1994) A sample of the material was collected in July 1992 and analyzed for VOCs, semi-volatile organics (SVOCs), gross alpha/beta, metals, nitrate, ammonia, pH and fecal coliform (DOE, 1993)

Fate of Constituents Released to Environment

Results of the VOC, SVOC, gross alpha/beta, metals, nitrate, ammonia, pH, and fecal coliform analyses indicate that only chromium and selenium in the sludge are slightly above background concentrations Chromium and selenium concentrations are 22 9 and 3 4 milligram per kilogram (mg/Kg), respectively (DOE, 1993) Background levels for these metals are 22 2 and 1 76 mg/Kg, respectively (DOE, 1995) RFCA Tier II surface soil action levels (open space) for these

metals are 3 67 x 10^4 (assuming Cr^{+6}) and 3 84 x 10^4 mg/Kg, respectively All other analytes were either not detected or within the expected background range

Action/No Further Action Recommendation

Analytical data for the sludge material discovered and designated as PAC NE-1406 show that concentrations of analytes in the sludge material are not indicative of a contaminant source Also, the chromium and selenium detected at concentrations slightly in excess of background are significantly below RFCA Tier II surface soil action levels (open space) which are based on an estimated cancer risk of 10^{-6} or a hazard index (HI) of 1 for noncarcinogenic toxicity (DOE, 1996) For this reason, PAC NE-1406 is proposed for NFA and poses no significant risk to human health The recommendation for NFA is consistent with the criteria for recommending NFA decisions presented in RFCA (DOE, 1996)

Comments

None

References

DOE, 1993, *Quarterly Update from April 1, 1993 to July 1, 1993 Historical Release Report*, Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1995, *Geochemical Characterization of Background Subsurface Soils· Background Soils Characterization Program* May

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

EG&G, 1994, Interoffice Correspondence to M C Broussard from N S Demos, Sampling of Soil Pile located Near the Modular Tanks of the 771 Hillside, February

PAC REFERENCE NUMBER: NW-170

IHSS Reference Number	170, Buffer Zone Operable Unit
Unit Name	PU&D Storage Yard
Approximate Location	N751,500, E2,082,000

Date(s) of Operation or Occurrence

1974 – 1994

Description of Operation or Occurrence

Historically, the Property Utilization and Disposal (PU&D) storage yard was used for storing empty drums and dumpsters, cargo boxes, cable spools, and similar materials The yard was divided in thirds with wire fences The eastern third was used for storage of scrap metal and encompassed the drum and dumpster storage areas The center third was used for the storage of equipment such as stainless steel tanks The western third was used for the storage of excess property The greatest potential for contamination was considered the eastern third because scrap metal may have been stored without prior decontamination and hazardous materials in drums and dumpsters were transferred in this area of the yard (DOE, 1992)

An incident involving a radioactively contaminated drum in the yard occurred in December 1987 An unknown powder spilled out of a drum while the drum, which had no bung and was believed to be empty, was being rolled over to a truck for off-Site recycling (DOE, 1992) Approximately 95 percent of the spilled powder was recovered with the affected soil and analyzed as a soil sample The drum was found to contain a small amount of radioactive powder This powder was not detected by exterior radiation monitoring, however results of a sample of the pure powder indicated 3,000 picoCuries per gram (pCi/g) plutonium, 1,000 pCi/g americium, and 100 pCi/g uranium-235 The powder was composed of 60 percent aluminum oxide and 32 5 percent chromium oxide (Rockwell, 1987, DOE, 1992)

An incident occurred in October 1990 involving drums stored in the yard Approximately 100 empty drums were stored in the yard with the bungs unsecured Rainwater that had entered the drums became contaminated with residual hazardous materials previously contained in the drums The rainwater was not radioactively contaminated (DOE, 1992)

Detonation of unstable reactive chemicals was conducted on three occasions at the PU&D Yard on December 28, 1996, November 1, 1997, and November 27, 1997 The types of chemicals regarded as unstable (benzoyl peroxide, 1-methyl 3-nitro 1-nitrosoguandidine, anhydrous ethyl ether, methyl ethyl ketone, ammonium perchlorate, kerosene, BZ alloy, red phosphorous) were permitted for disposal using detonation methods by the CDPHE and EPA Air sampling and

radiological surveys were conducted prior to and after each event and there were no reported injuries associated with the operations (DOE, 1997)

Physical/Chemical Description of Constituents Released

A powder composed primarily of aluminum and chromium oxides and contaminated with plutonium, americium, and uranium was spilled Other releases may have occurred from leaking batteries, drums, and scrap metal stored without prior decontamination Hazardous materials in drums and dumpsters were transferred in this area of the yard and may have resulted in release(s) (DOE, 1992)

Responses to Operation or Occurrence

An internal investigation report was generated after the unknown powder incident PU&D, Waste Operations, and Waste Guidance groups were involved with the cleanup operations resulting from the rainwater in the drums The liquid in the drums was disposed in accordance with Site waste procedures The drum bungs were tightened to prevent potential re-occurrence and drum decontamination procedures were implemented (DOE, 1992)

Assessment of environmental contamination attributable to PU&D yard operations was initiated in accordance with the IAG as part of OU 10 (EG&G, 1995, RMRS, 1997)

Fate of Constituents Released to Environment

In 1994, approximately 235 soil gas locations were sampled for VOC analysis and 71 surface soil locations were sampled and analyzed for metals, SVOCs, pesticides and PCBs. The data, presented in EG&G (1995), indicated that VOCs were potentially present in subsurface soils along the eastern third of the yard (DOE, 1997)

A pre-remedial investigation of IHSSs 170, 174A and 174B was performed in August 1997 Characterization of the PU&D Yard was conducted to investigate the potential presence of a VOC contaminant source The investigation consisted of 20 soil borings and 38 subsurface soil samples analyzed for VOCs In most cases, the borehole locations corresponded with the areas where VOC detections in soil gas samples were observed in the 1994 survey (RMRS, 1997) As a result, borehole locations within IHSS 170 were concentrated in the eastern third of the IHSS Additionally, two boreholes were placed in areas of visibly stained soil. Table 1 summarizes the analytical results for soil borings associated with IHSS 170 (RMRS, 1997)

Table 1 VOC analytical results for subsurface soil (RMRS, 1997) in micrograms per kilogram (µg/Kg)

Borehole No	Sample Depth (ft)	Methylene Chloride µg/Kg	Napthalene µg/Kg
17797	4 4-4 9	2,100B	<630 (ND)
17897	5 4-5 9	<630 (ND)	390J
18097	5 0-5 5	440JB	<630 (ND)
18097(DUP)	4 5-5 0	420JB	<630 (ND)
18197	5 0-5 5	2,600B	<630 (ND)
18297	5 0-5 5	400JB	<630 (ND)
18397(A)	5 0-5 5	400JB	<630 (ND)
18497(A)	5 0-5 5	410JB	<630 (ND)
18597(A)	5 0-5 5	370JB	<630 (ND)
18697(A)	5 0-5 5	400JB	<630 (ND)

DUP = Duplicate sample
A = Borehole location immediately adjacent (downgradient) to the IHSS
ND = Not detected
J = estimated concentration of analyte detected below the method practical quantitation limit
B = analyte detected in the method blank

As indicated in Table 1, methylene chloride (a common laboratory contaminant) was detected in most of the subsurface soil samples, however, the contaminant was also detected in the method blank associated with the analyses As a result, the identification of methylene chloride in the samples is most likely attributable to laboratory contamination. Napthalene was estimated in one sample from borehole 17879 at 390 µg/Kg, substantially below the Tier I subsurface soil action level of >1 x10^6 (RMRS, 1997)

Each soil boring had a pre-work 17-point survey performed with a Field Instrument for the Detection of Low-Energy Radiation (FIDLER) Based on the survey results, the three highest FIDLER measurements were selected for surface soil samples and analyzed for isotopic radionuclides The isotopic results were below background levels (RMRS, 1997)

Six groundwater samples were collected during the pre-remedial investigation of IHSSs 170, 174A and 174B Three of the six samples were within the IHSS 170 boundary Table 2 summarizes the analytical results for these three samples (RMRS, 1997)

Table 2 VOC analytical results for groundwater (RMRS, 1997) in µg/L

Borehole No	Sample Depth (ft)	PCE µg/L	1,1,1-TCA µg/L	Trichloro-trifluoroethane µg/L
17897	7 33	<5 (ND)	<5 (ND)	3 5J
18097	7 2	<5 (ND)	<5 (ND)	<5 (ND)
18197	8 9	15	6 3	<5 (ND)

NA = Not Applicable
ND = Not detected
J = estimated concentration of analyte detected below the method practical quantitation limit
B = analyte detected in the method blank

Based on the analytical results from the pre-remedial investigation, a VOC contaminant source was not identified Additionally, concentrations of VOCs equal to or above the RFCA Tier I subsurface soil action levels were not identified in the area of IHSS 170 (see Table 1) (RMRS, 1997) RFCA Tier I subsurface soil action levels for organic contaminants are based on leachability to groundwater at Tier I groundwater action levels PCE detected in groundwater (see Table 2) indicates that the area was likely affected by previous drum storage and handling operations However, PCE was not detected in the boreholes placed in the area indicating a residual source in excess of action levels does not remain.

The PCE concentration of 15 µg/L detected in groundwater from borehole 18197 is above the RFCA Tier II groundwater action level of 5 µg/L Trichlorotrifluoroethane was also detected in groundwater from IHSS 170 that also may indicate impact from past practices (i.e , freon-based lathe coolant) However, a RFCA action level or Programmatic Preliminary Remediation Goal (PPRG) for the compound has not been calculated The 1,1,1-TCA was below the RFCA Tier II groundwater action level of 200 µg/L

Action/No Further Action Recommendation

Based upon subsurface soil analytical data collected during the pre-remedial investigation, an existing source of contamination associated with IHSS 170 cannot be identified Additionally, concentrations of VOCs equal to or above the RFCA Tier I subsurface soil action levels were not identified in the area of IHSS 170 (see Table 1) (RMRS, 1997) RFCA Tier I subsurface soil action levels for organic contaminants are based on leachability to groundwater at Tier I groundwater action levels As a result, IHSS 170 poses no threat to groundwater and is proposed as NFA. The recommendation for NFA is consistent with the criteria for recommending NFA decisions presented in RFCA.

Groundwater at IHSS 170 containing PCE concentrations above the RFA Tier II groundwater action level is not considered in the Action/NFA recommendation because groundwater contamination at RFETS is addressed per RFCA by the Integrated Monitoring Program (RFETS, 1996) A plume of VOC contamination, which encompasses IHSS 170, has been delineated The plume is monitored by the RFCA groundwater monitoring program at the perimeter Monitoring

indicates that there are no known or potential surface water impacts Details on the groundwater monitoring program are reported annually in the Annual RFCA Groundwater Monitoring Report(s) (RMRS, 1998)

Comments

IHSS 170 overlaps with PACs NW-174A , NW-174B (IHSSs 174A and 174B) and PACs NW-1500, and NW-1501

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1997, *Annual Update for the Historical Release Report*, Revision 0 RF/RMRS-97-073 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

EG&G 1995, *Draft Technical Memorandum 1, OU 10, Other Outside Closures*, Rocky Flats Environmental Technology Site, Golden, CO, January

RFETS, 1996, *Integrated Water Management Plan for the Rocky Flats Environmental Technology Site (Final)*, RF/ER-96-0037, RFETS, Golden, CO, August

RMRS, 1997, *Data Summary Report for IHSSs 170, 174A, and 174B, Property Utilization and Storage Yard*, RF/RMRS-097-080 UN, Rocky Flats Environmental Technology Site, Golden, CO , September

RMRS, 1998, *Draft 1997 Annual RFCA Groundwater Monitoring Report*, RF/RMRS-98-273 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

Rockwell, 1987, Internal Letter to File from F J Blaha Subject Empty Drum Recycling Incident of 12/4/87, December 17

PAC REFERENCE NUMBER: NW-174A & NW-174B

IHSS Reference Number	174, Buffer Zone Operable Unit
Unit Name	PU&D Drum Storage Facility (NW-174A) PU&D Dumpster Storage Facilities (NW-174B)
Approximate Location	N752,000, E2,082,000

Date(s) of Operation or Occurrence

1974 – 1994

Description of Operation or Occurrence

Two areas within the PU&D storage yard (PAC NW-170) were specified for container storage One area stored drums (PAC NW-174A) and the other was designated for a dumpster (PAC NW-174B) Until August 1985, the drum storage area was used for the storage of RCRA-regulated waste (DOE, 1992) Subsequent to this, the area was used for the storage of empty drums (RMRS, 1997a) All drums were externally monitored for radiation prior to shipment to the PU&D yard The contents of drums originating from areas that handled radioactive materials were sampled and analyzed prior to shipment to the PU&D yard At times, the level of radioactivity set for acceptance in the yard was exceeded and drums were returned to their building of origin Dumpsters were also located at buildings and moved to the storage area when filled The dumpsters and drums were stored directly on the ground surface Material was stored in these areas prior to shipment for off-Site recycling (DOE, 1992). Storage in these areas stopped in 1994 and all containers were removed (RMRS, 1997a)

An incident in May 1982 identified two drums of liquid stored in the PU&D storage area as being pressurized with bulging drum heads A third drum was noted to have exploded with the bottom blown out No documentation was found which indicated a release to the environment as a result of these damaged drums No other documentation was found describing other releases to the environment (DOE, 1992)

Physical/Chemical Description of Constituents Released

The drums held waste oils which contained hazardous constituents, waste paints, and spent paint thinner Waste oils were typically derived from equipment and vehicle maintenance activities The dumpster storage area was for the storage of stainless steel chips coated with freon-based or oil-based lathe coolant (DOE, 1992)

The dumpster contained stainless steel chips coated with lathe coolant The lathe coolant was either freon-based or oil-based Radioactive contamination of the chips was not expected due to

the presence of administrative controls to prevent radioactively contaminated material from being shipped to the yard (DOE, 1992)

Visible staining is apparent on the soil in the dumpster storage area from spills which occurred during transfer and from rainwater washing residual oil from metal shavings onto the ground (DOE, 1992)

Responses to Operation or Occurrence

Visual monitoring of the drum and dumpster storage areas was conducted periodically Although visible staining on the ground surface was documented in the drum storage area, no documentation of leaks or spills was found (DOE, 1992)

The drums involved in the May 1982 incident were subsequently removed to the hazardous waste storage area (PAC NW-203) west of the Present Landfill and the contents identified. It is presumed that the drums were located in the drum storage area of the PU&D storage facility (DOE, 1992)

Assessment of environmental contamination attributable to PU&D yard operations was initiated in accordance with the IAG as part of OU 10 and as part of a separate, pre-remedial investigation (EG&G, 1995, RMRS, 1997a)

Fate of Constituents Released to Environment

In 1994, approximately 235 soil gas locations were sampled for VOC analysis and 71 surface soil locations were sampled and analyzed for metals, SVOCs, pesticides and PCBs The data, presented in EG&G (1995), indicated that VOCs were potentially present in subsurface soils along the eastern third of the yard (DOE, 1997)

A pre-remedial investigation of IHSSs 170, 174A and 174B was performed in August 1997 Characterization of the PU&D Yard was conducted to investigate the potential presence of a VOC contaminant source capable of impacting groundwater The investigation consisted of 20 soil borings and 38 subsurface soil samples analyzed for VOCs In most cases, the borehole locations correspond with the areas where VOC detections in soil gas samples were observed in the 1994 survey (RMRS, 1997b) Borehole locations associated with IHSS 174A were placed within the IHSS boundary and immediately northwest where VOC detections in soil gas were observed One borehole (17997) was located within the IHSS 174B boundary Table 1 summarizes the analytical results for soil borings associated with IHSSs 174A and 174B (RMRS, 1997b)

Table 1 VOC analytical results for soil (RMRS, 1997b) in µg/Kg

Borehole No	Sample Depth (ft)	PCE µg/Kg	TCE µg/Kg	Methylene Chloride µg/Kg
17097(A)	5 0-5 5	<630 (ND)	<630 (ND)	620J
17097(A)	10 0-10 5	<630 (ND)	<630 (ND)	664
17197(A)	5 5-6 0	<630 (ND)	<630 (ND)	685
17197(A)	10 25-10 5	<630 (ND)	<630 (ND)	689
17297(A)	5 0-5 5	<630 (ND)	<630 (ND)	1,600B
17297(A)	10 5-11 0	<630 (ND)	<630 (ND)	1,400B
17497	4 3-4 9	750	<630 (ND)	1,300B
17497	8 5-9 0	830	<630 (ND)	<630 (ND)
17497	11 0-11 5	5,700	<630 (ND)	<630 (ND)
17597	4 7-5 3	<630 (ND)	<630 (ND)	<630 (ND)
17597	11 0-11 5	<630 (ND)	<630 (ND)	<630 (ND)
17597(DUP)	10 5-11 0	<630 (ND)	<630 (ND)	330JB
17697	5 5-6 0	<630 (ND)	<630 (ND)	530JB
17697	9 8-10 3	<630 (ND)	<630 (ND)	610JB
17997	5 0-5 5	<630 (ND)	<630 (ND)	<630 (ND)
17997	9 5-10 0	<630 (ND)	<630 (ND)	<630 (ND)
17997	15 0-15 5	<630 (ND)	<630 (ND)	<630 (ND)
17997	19 5-20 0	<630 (ND)	<630 (ND)	<630 (ND)
18997	5 0-5 5	<630 (ND)	360J	430JB
18997	9 5-10 0	<630 (ND)	<630 (ND)	3,000JB

DUP = Duplicate sample
A = Borehole location immediately adjacent to the IHSS
ND = Not detected
J = estimated concentration of analyte detected below the method practical quantitation limit
B = analyte detected in the method blank

As indicated on Table 1, PCE was detected throughout the sampled interval in borehole 17497 located in IHSS 174A. The concentrations observed were below the RFCA Tier I subsurface soil action level of 11,500 µg/Kg TCE was also detected in one sample (Borehole 18997) at a concentration of 360J µg/Kg which is below the RFCA Tier I subsurface action level of 9,270 µg/Kg Methylene chloride (a common laboratory contaminant) was also detected in most of the subsurface soil samples from IHSS 174B and was also detected in the method blank(s) associated with some of the analyses As a result, the identification of methylene chloride in the samples is most likely attributable to laboratory contamination No contamination was detected in subsurface soils from IHSS 174B (RMRS, 1997b)

Each soil boring had a pre-work 17-point survey performed with a FIDLER Based on the survey results, the three highest FIDLER measurements were selected for surface soil samples and analyzed for isotopic radionuclides Although the isotopic results were below background levels, it is noted that the highest FIDLER measurements were within IHSS 174B (RMRS, 1997b)

Six groundwater samples were collected during the pre-remedial investigation of IHSSs 170, 174A and 174B Of the six samples, one sample from IHSS 174A and 174B (i e , one from each IHSS) was collected Table 2 summarizes the analytical results (RMRS, 1997b)

Table 2 VOC analytical results for groundwater (RMRS, 1997b) in µg/L

Borehole No	Sample Depth (ft)	PCE µg/L	1,1,1-TCA µg/L	Trichloro-trifluoroethane µg/L
17497	10 3	1,700	<250 (ND)	<250(ND)
17797	7 9	<5 (ND)	2 1J	40
17797(DUP)	7 9	<5 (ND)	<5(ND)	36

NA = Not Applicable
DUP = Duplicate sample
ND = Not detected
J = estimated concentration of analyte detected below the method practical quantitation limit
B = analyte detected in the method blank

Based on the analytical results from the pre-remedial investigation, a VOC contaminant source equal to or above the RFCA Tier I subsurface soil action levels was not identified in either IHSS 174A or IHSS 174B (see Table 1) (RMRS, 1997b) RFCA Tier I subsurface soil action levels for organic contaminants are based on leachability to groundwater at Tier I groundwater action levels PCE is observed in the subsurface soil sampled from borehole 17497 in IHSS 174A as well as groundwater from that borehole (see Table 2) indicating that the area was likely affected by previous drum storage and handling operations However, the concentrations detected in the 7 boreholes placed in the IHSS 174A area do not indicate that a residual source in excess of action levels remains

The PCE concentration of 1,700 µg/L detected in groundwater from borehole 17497 is above the RFCA Tier II groundwater action level of 5 µg/L Trichlorotrifluoroethane was detected in groundwater from IHSS 174B that also may indicate impact from past waste storage and handling practices (i.e , freon-based lathe coolant) However, a RFCA action level or PPRG for the compound has not been calculated

Action/No Further Action Recommendation

Based on the subsurface soil sampling data, residual PCE contamination is observed in IHSS 174A and has likely contributed to the degradation of groundwater in the vicinity of the IHSS However, the concentrations observed in the 7 boreholes placed in the area do not equal or exceed RFCA Tier I subsurface soil action levels indicating that an appreciable source of contamination to groundwater does not remain. RFCA Tier I subsurface soil action levels for organic contaminants are based on leachability to groundwater at Tier I groundwater action levels Because of the lack of a source of contamination above RFCA action levels, IHSS 174A is proposed as NFA.

Based on the subsurface soil sampling data, a source of contamination associated with IHSS 174B cannot be identified Trichlorotrifluoroethane, detected in groundwater, was not detected in the subsurface soil indicating that if a contaminant source existed, concentrations have attenuated As a result, IHSS 174B poses no threat to groundwater and therefore is proposed as NFA.

Groundwater at IHSS 174A containing PCE concentrations above the RFCA Tier II groundwater action level is not considered in the Action/NFA recommendation because groundwater contamination at RFETS is addressed per RFCA by the Integrated Monitoring Program (RFETS, 1996) A plume of VOC contamination, which encompasses IHSS 174A, has been delineated The plume is monitored by the RFCA groundwater monitoring program at the perimeter Monitoring indicates that there are no known or potential surface water impacts Details on the groundwater monitoring program are reported annually in the Annual RFCA Groundwater Monitoring Report(s) (RMRS, 1998)

Comments

IHSSs 174A and 174B overlap with IHSS 170

The dumpster storage area was located along the western side of the east third of the PU&D Yard The dumpsters were stored in various locations over an area along the fence in an area significantly larger than that indicated on the IAG map There is visible staining on the ground in the dumpster storage area (DOE, 1992)

These areas were RCRA-regulated units because they contained hazardous waste and were in operation in 1981 An Interim Status Closure Plan for these storage areas was prepared in 1986 and revised in 1988 These RCRA closure plans were superseded by the RFI/RI process outlined in the IAG EPA aerial photos reveal no activity in the PU&D area in August 1971 but clearly indicate that the area was used for storage in August 1978 (DOE, 1992)

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1997, *Annual Update for the Historical Release Report*, Revision 0 RF/RMRS-97-073 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

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RFETS, 1996, *Integrated Water Management Plan for the Rocky Flats Environmental Technology Site (Final)*, RF/ER-96-0037, RFETS, Golden, CO, August

RMRS, 1997a, *Final Sampling and Analysis Plan for the Pre-Remedial Investigation of IHSSs 170, 174A and 174B, Property Utilization & Storage Yard*, RF/RMRS-97-036, Rev 0, Rocky Flats Environmental Technology Site, Golden, CO, August

RMRS, 1997b, *Data Summary Report for IHSSs 170, 174A, and 174B, Property Utilization and Storage Yard*, RF/RMRS-097-080 UN, Rocky Flats Environmental Technology Site , Golden, CO, September

RMRS, 1998, *Draft 1997 Annual RFCA Groundwater Monitoring Report*, RF/RMRS-98-273 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

PAC REFERENCE NUMBER: NW-203

IHSS Reference Number	203, Operable Unit 7
Unit Name	Inactive Hazardous Waste Storage Area
Approximate Location	N752,000, E2,082,500

Date(s) of Operation or Occurrence

1986 – 1988

Description of Operation or Occurrence

An area at the southwestern portion of the Present Landfill (PAC NW-114) was operated as a hazardous waste storage area for both drummed liquid and solid waste All containers with free liquids were stored within two 40-ft cargo containers with interior secondary containment Some drums containing only solid waste were stored outside At maximum capacity, the area consisted of eight 20-ft cargo containers and six 40-ft cargo containers A total of 384 55-gallon drums could be stored Two of the containers were used to store PCB-contaminated soil and debris and PCB-contaminated transformer oil (DOE, 1992)

An incident occurred on June 11, 1987 in which a drum of epoxy chemicals overheated The overheating was caused by an exothermic reaction during the formation of epoxy No release to the environment occurred because of this incident A small spill (i e., less than 4 fluid ounce) from a leaking drum was discovered in a cargo container June 21, 1988 The material had traces of PCBs (DOE, 1992)

Miscellaneous solid and liquid hazardous, non-radioactive wastes containing organic compounds and PCBs were stored at this site Controls, which met regulatory standards, were in place to prevent leaks and spills Spills of less than reportable quantities may have occurred from the drums during transfer of materials into and out of the drums (DOE, 1992)

Because of the distance of the area from plant operations, this area was considered inconvenient for use as a hazardous waste storage area The use of this area stopped in 1988 (DOE, 1992)

Physical/Chemical Description of Constituents Released

Analytical results of the materials stored in the area suggest that surficial contamination may exist for metals, PCBs, radionuclides, and possibly VOCs (DOE, 1992)

Responses to Operation or Occurrence

In response to the incident of the overheated drum, the Fire Department removed the drum to an open area to cool down The drum was opened later by waste management personnel without incident

The drum which leaked PCBs in 1988 was placed into an 83-gallon overpack drum and the cleanup material was placed in a waste drum (DOE, 1992)

Fate of Constituents Released to Environment

An evaluation of the nature and extent of contamination associated with IHSS 203 was performed using data collected during implementation of the OU 7 Phase I RFI/RI Work Plan (DOE, 1991) These data were collected and presented in the Final Work Plan Technical Memorandum for OU 7 (DOE, 1994)

As summarized in DOE (1994), soil gas and surface soil sampling were conducted during the Phase I RFI/RI Soil-gas samples were collected at 35 locations at approximately 5 ft below ground surface and analyzed for VOCs Concentrations of VOCs in soil gas varied significantly within the sampling area and, as a result, a distinct source area was not identified Because landfill wastes underlie IHSS 203, it was concluded that VOCs in soil gas in this area are probably associated with the landfill waste rather than potential releases from IHSS 203 (DOE, 1996a)

Surface soil samples were collected at 49 locations from 0- to 2-inches and from 18 locations from 0- to 10-inches Based on the suspected contaminants, results, and conclusions of the soil gas survey, the samples were analyzed for PCBs, metals, and radionuclides The analytical results for analytes with concentrations identified above background in IHSS 203 samples are presented in Table 1 (DOE, 1994)

Table 1. Analytical results for potential contaminants of concern for IHSS 203 (DOE, 1994) and RFCA surface soil action levels (DOE, 1996b)

Analyte	RFCA Tier I surface soil action levels	RFCA Tier II surface soil action levels	Mean concentration	Concentration range
Sample Depth 0 to 2 inches				
Calcium	NA	NA	10,064	439 - 87,000
Cobalt	4.61×10^5	4.61×10^5	6	1.1 - 27.1
Copper	3.07×10^5	3.07×10^5	16	5.7 - 34.9
Vanadium	5.38×10^4	5.38×10^4	27	8.4 - 66.2
Am-241	215	38	0.03	0.00363 - 0.3427
Ra-226	NA	NA	1.0	0.665 - 1.41
U-235	135	24	0.039	-0.0149 - 0.199
Aroclor-1254	232	2.32	0.04	0.0099 - 0.100
Aroclor-1260	232	2.32	0.043	0.011 - 0.0160
Sample Depth 0 to 10 inches				
Calcium	NA	NA	9,437	972 - 22,300
Copper	3.07×10^5	3.07×10^5	18	9 - 41.6
Sodium	NA	NA	403	37.8 - 3,000
Aroclor-1254	232	2.32	0.046	0.046 - 0.095
Aroclor-1260	232	2.32	0.044	0.020 – 0.100

NA = Not applicable
Metals concentrations in mg/Kg
Radionuclide concentrations in picocuries per gram (pCi/g)
PCB concentrations in mg/Kg

Action/No Further Action Recommendation

Analytical data for surficial soils show that contamination associated with IHSS 203 (PAC NW-203) is below RFCA Tier I and Tier II surface soil action levels (DOE, 1996b) indicating an appreciable source of contamination does not exist For this reason, IHSS 203 (NW-203) does not warrant further investigation and is proposed for NFA.

Comments

IHSS 114 overlaps with IHSS 203

The presumptive remedy approach was initially adopted for OU 7 in May 1994 (DOE 1994) with letter approval of the approach received from CDPHE in October of 1994 (CDPHE 1994) As presented in DOE (1996a, 1996c), the presumptive remedy for IHSS 114, the Present Landfill, which is planned to encompass IHSS 203 is a cover

This area was Unit #1 in the November 1986 RCRA Part B Permit Application Unit #1 was relocated to its present position in the 500 Area in 1988 (PAC 500-903) (DOE, 1992) PAC 500-903 is considered NFA per CDPHE and EPA (EPA,1992)

References

CDPHE, 1994, Letter from G Baughman, CDPHE, to F Lockhart, DOE, Re Closure Process for RCRA Units under the IAG, May 29

DOE, 1991, *Final Phase I RFI/RI Work Plan Rocky Flats Plant, Present Landfill IHSS 114 and Inactive Hazardous Waste Storage Area IHSS 203 (Operable Unit No 7)*, Rocky Flats Environmental Technology Site, Golden, CO, August

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1994, *Final Work Plan Technical Memorandum for OU 7*, RF/ER-94-00044, Rocky Flats Environmental Technology Site, Golden, CO, September

DOE 1996a, *OU 7 Revised Draft Interim Measures/Interim Remedial Action (IM/IRA) Decision Document and Closure Plan*, RF/ER-96-0009 UN, Rocky Flats Environmental Technology Site, Golden, CO, March

DOE, 1996b, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1996c, *Annual Update for the Historical Release Report*, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, CO, September

EPA, 1992, Correspondence to R Schassburger, DOE RFO, from M Hestmark, EPA Region VIII, RE Potential Areas of Concern Needing Further Investigation, December 23

PAC REFERENCE NUMBER: NW-1500

IHSS Reference Number	170, Buffer Zone Operable Unit
Unit Name	Diesel Spill at PU&D Yard
Approximate Location	N751,500, E2,082,000

Date(s) of Operation or Occurrence

December 17, 1992

Description of Operation or Occurrence

Approximately 1 1/2 gallons of diesel fuel spilled onto the ground in the southeast corner of the PU&D storage yard during a routine, forklift truck fueling operation The incident was reported on December 17, 1992 to EG&G Waste Regulatory Programs, EG&G ER Management and the Occurrence Notification Center A fuel nozzle assembly was placed on an automatic setting but failed to shut off automatically when the fuel tank reached capacity (DOE, 1993) The location of the spill is within the IHSS 170 boundary

Physical/Chemical Description of Constituents Released

The constituent released was diesel fuel (DOE, 1993)

Responses to Operation or Occurrence

The soil affected by the spill was excavated and containerized Samples of the excavated material were collected for waste dispositioning purposes The area affected by the spill was surveyed using Global Positioning System (GPS) on March 15, 1993

Assessment of environmental contamination attributable to PU&D yard operations was initiated in accordance with the IAG as part of OU 10 (EG&G, 1995, RMRS, 1997)

Fate of Constituents Released to Environment

PAC NW-1500 is located within the boundary of IHSS 170 and, as a result, was investigated along with the characterization of this IHSS Approximately 235 soil gas locations were sampled for VOC analysis and 71 surface soil locations were sampled and analyzed for metals, SVOCs, pesticides and PCBs across IHSS 170 The data, presented in EG&G (1995), indicated that VOCs were potentially present in subsurface soils along the eastern third of the yard (DOE, 1997)

A pre-remedial investigation of IHSS 170, which included the area of PAC NW-1500 was performed in August 1997 IHSSs 174A and 174B were also included in this pre-remedial

investigation Characterization of the PU&D Yard was conducted to investigate the potential presence of a VOC contaminant source Characterization for this purpose would detect residual contamination associated with the diesel fuel spill designated as PAC NW-1500 The investigation consisted of 20 soil borings and 38 subsurface soil samples analyzed for VOCs In most cases, the borehole locations correspond with the areas where VOC detections in soil gas samples were observed in the 1994 survey (RMRS, 1997) Borehole locations within IHSS 170 and PAC NW-1500, were concentrated in the eastern third of the IHSS Table 1 summarizes the analytical results for soil borings associated with IHSS 170 which can be visually correlated to the area of the diesel fuel spill (PAC NW-1500) (RMRS, 1997)

Table 1 VOC analytical results for soil (RMRS, 1997) in µg/Kg

Borehole No	Sample Depth (ft)	Methylene Chloride µg/Kg
18097	5 0-5 5	440JB
18097(DUP)	4 5-5 0	420JB
18197	5 0-5 5	2,600B
18297	5 0-5 5	400JB
18397(A)	5 0-5 5	400JB
18497(A)	5 0-5 5	410JB
18597(A)	5 0-5.5	370JB
18697(A)	5 0-5 5	400JB

DUP = Duplicate sample
A = Borehole location immediately adjacent (downgradient) to the IHSS
ND = Not detected
J = estimated concentration of analyte detected below the method practical quantitation limit
B = analyte detected in the method blank

As indicated on Table 1, methylene chloride (a common laboratory contaminant) was the only contaminant detected in the boreholes placed in the area of PAC NW-1500 Methylene chloride was detected in most of the subsurface soil samples, however, the contaminant was also detected in the method blank associated with the analyses As a result, the identification of methylene chloride in the samples is most likely attributable to laboratory contamination (RMRS, 1997) Additionally, methylene chloride is not a component of diesel fuel

Six groundwater samples were collected during the pre-remedial investigation of IHSSs 170, 174a and 174b Two of the six samples were within the IHSS 170 boundary and correlate to the area of the PAC NW-1500 These data are discussed in PACs NW-170 and NW-174A and 174B Contaminants detected in the groundwater (i e , PCE, 1,1,1-TCA, and trichlorotrifluoroethane) are not components of diesel fuel

Based on the analytical results from the pre-remedial investigation, a VOC contaminant source attributable to the fuel oil spill (PAC 1500) was not identified The contaminants detected are not components of diesel fuel

Action/No Further Action Recommendation

Based upon the subsurface soil sampling data, an existing or residual source of contamination associated with PAC NW-1500 cannot be identified It is evident from these results that the response to the occurrence successfully remediated the release and as a result, PAC NW-1500 poses no threat of adverse health affects to human receptors PAC NW-1500 is proposed as NFA. The recommendation for NFA is consistent with the criteria for recommending NFA decisions presented in RFCA (DOE, 1996)

Comments

None

References

DOE, 1993, *Quarterly Update from January 1, 1993 to April 1, 1993 Historical Release Report*, 93-RF-5296, Rocky Flats Environmental Technology Site, Golden, CO, April

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1997, *Annual Update for the Historical Release Report*, Revision 0 RF/RMRS-97-073 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

EG&G, 1995, *Draft Technical Memorandum 1, OU 10, Other Outside Closures*, Rocky Flats Environmental Technology Site, Golden, CO, January

RMRS, 1997, *Data Summary Report for IHSSs 170, 174A, and 174B, Property Utilization and Storage Yard*, RF/RMRS-097-080 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

PAC REFERENCE NUMBER: 000-101

IHSS Reference Number	101, Operable Unit 4
Unit Name	Solar Evaporation Ponds
Approximate Location	N751,000, E2,085,000

Date(s) of Operation or Occurrence

The Solar Ponds have operated in varying configurations since December 1953 when waste was first sent to the original clay-lined solar pond This original clay-lined pond was supplemented and eventually replaced by other Solar Ponds The first use of a solar pond typically began shortly after construction of the pond was completed The dates of completion and last use of the various Solar Ponds are presented in the original HRR submitted in 1992 (DOE, 1992)

Description of Operation or Occurrence

The Solar Ponds were used primarily for the disposal of low-level radioactive wastes contaminated with high concentrations of nitrate Building 774, the process waste treatment plant was designed primarily for the removal of radioactive contaminants and not the removal of nitrate The Solar Ponds were also used for the disposal of other difficult to treat wastes The design of the original solar pond is documented in Dow drawing 1-1454-207 It was estimated in late summer 1955 that this pond (Pond 2) would be incapable of holding the waste volumes expected to be generated through the winter months, therefore, this pond was supplemented with an auxiliary pond in September 1955 The auxiliary pond was built adjacent to the southeast corner of Pond 2 These two ponds shared a common corner with an overflow channel connecting the two Water exceeding a certain level in Pond 2 would flow into Pond 2 Auxiliary Construction of the first lined pond (known at that time as Pond 2A, later designated Pond 207A) was prompted by the knowledge that nitrate contamination from the earthen ponds was moving off the RFP (on April 5, 1955 the effluent leaving the RFP boundary, at that time the cattle fence, contained 90 milligram per liter [mg/L] nitrate), as well as the fact that Great Western Reservoir was going to be used as a human drinking water supply The first leakage of water from any of the Solar Ponds had been noted in June 1954 with the identification of a nitrate contaminated spring on the hillside north of the Solar Ponds The first lined pond was built of asphalt planking (asphalt impregnated wood approximately 1/2-inch thick) This pond was constructed immediately to the east of the two earthen ponds Dow Chemical drawing 1-3398-207 documents the relationship of the new lined pond with the pre-existing earthen ponds All references in this document will henceforth use 207A to reference the first lined pond (DOE, 1992)

Following construction of the first lined pond (Pond 207A), the original pond and the auxiliary pond were allowed to dry The original-clay lined pond had some additional clay added to its east side to prevent leakage, and the auxiliary pond was fully lined with clay These ponds were returned to service shortly after these lining activities took place The clay-lined ponds were used

routinely until June 1960 After June 1960, routine use of the clay-lined ponds is not documented, although an additional release to Pond 2 was made in March 1963 Photographs of Ponds 2, 2 Auxiliary, and 207A have been located which clearly show the three ponds and their physical relationship to each other (DOE, 1992)

The next major change in operations at the Solar Ponds came with the creation of a third earthen pond in support of testing on oxidation of wastes The third earthen cell was constructed in April 1959 The existing references indicate that the three earthen cells were used in series and the effluent from these three ponds was discharged to the sanitary wastewater treatment plant These tests were carried out over a few months, the late summer and early fall of 1959, and were ultimately unsuccessful The third earthen cell was constructed immediately east of the existing Pond 2, immediately west of 207A, and immediately north of Pond 2 Auxiliary The designation of this new pond was either Pond 2C or 2D, with the existing Pond 2 Auxiliary receiving the remaining designation. It appears that the Pond 2 Auxiliary designation was no longer used (DOE, 1992)

Construction of the 207B Solar Ponds began on November 11, 1959 These ponds are immediately east of Pond 207A and consist of three separate cells (North, Center, and South) During December 1959 construction activities, seepage was identified in the west side of the excavation near the east side of Pond 207A. A "covered drainage ditch" (later references to this device use the term drainage tile, this discussion will also use drainage tile) was installed to collect the seepage water and release it to the hill just north of the ponds Dow Chemical drawing 1-6217-207 documents the design and configuration of the asphalt plank-lined 207B Solar Ponds Construction of the 207B Solar Ponds was fully completed on June 16, 1960 The first placement of waste in the 207B ponds occurred on May 31, 1960 into a fully completed cell Upon use of the fully completed 207B ponds, leaks were almost immediately identified and the ponds were removed from service The leakage from the ponds was attributed to the reaction of acid wastes seeping beneath the asphalt planking and reacting with marl soil to produce carbon dioxide gas This gas then caused the asphalt floor of the ponds to lift, rupturing the seams. A new lining and design for the 207B ponds was designed and submitted for bids The bids received in November 1960 were too high, and so the new pond configuration was redesigned and re-bids were requested for just the south portion of the 207B ponds Repair and re-lining of the 207B-South solar pond were completed on November 29, 1960 The 207B-South cell was returned to service in December 1960 Work on repair of 207B-North and Center was started in April 1961 This work included the construction of a drainage tile immediately east of the 207B ponds that drained to the north Difficulty was encountered in laying the asphalt on the bottom of 207B-North It was found necessary to remove the asphalt planking in order to lay the asphalt concrete on the bottom The repairs to 207B-Center and North were completed on August 17, 1961 Pond 207B Center was returned to service on August 25, 1961, and 207B-North was returned to service on August 28, 1961 (DOE, 1992)

Work related to the relining and redesign of Pond 207A began in April 1963 with the removal of liquids and salts so that the liner could be accessed As Pond 207A was emptied salts and sands remaining in the pond were drummed for removal from the ponds Tests were conducted to

determine whether the asphalt planking to be removed from the pond would be suitable for burning It was found that the asphalt planking would not support combustion on its own Removal of the asphalt planking and Pond 207A sub-grade preparation was completed in September 1963 Disposal of the asphalt planking took place in the East Trenches (PAC NE-111 1 - NE-111 8) Relining and redesign of Pond 207A continued through November 18, 1963 Wastes were again placed in Pond 207A on May 28, 1964 (DOE, 1992)

Solar Pond 207C was constructed in 1970 primarily to allow the transfer of water from other Solar Ponds so that they could be repaired The design of Pond 207C included a leak detection pipe placed immediately beneath the solar pond and running from south to north where it drains into a leak detection sump Solar Pond 207C has remained in constant service since the beginning of its use (DOE, 1992)

In the mid-1980s activities for solar pond clean-out began The first step in these activities was to construct a building (Building 788) in which the solar pond sludge and Portland cement could be mixed to create "pondcrete " This building was constructed between Solar Ponds 207A and 207C Solar Pond sludge clean-out began in mid-1986 This activity along with the transfers of solar pond water to the Building 374 evaporator, have helped to remove both the sludges and the liquids from the Solar Ponds At times however, problems with the clean-out effort have occurred Examples of these problems include pondcrete that has not hardened properly and flooding of some of the valve vaults used to help transfer solar pond water to Building 374 for evaporation (DOE, 1992)

An event related to Solar Ponds on August 7, 1989, required the filing of a RCRA Contingency Plan Implementation Report (Report Number 89-012) This event consisted of an overflow of contaminated water from the Interceptor Trench Pump House (ITPH) wet well. This overflow occurred because the circuit breakers supplying electricity to the pump motors were both tripped Additional details concerning this incident can be found in the "Response" section of this PAC narrative (DOE, 1992)

A second event at the Solar Ponds took place from March 14, 1990 to March 16, 1990 which also required the filing of a RCRA Contingency Plan Implementation Report (Report Number 90-003) This event consisted of transfer of contaminated groundwater and precipitation from Pond 207B-North into Pond 207A. This transfer was made due to the lack of freeboard in Pond 207B-North which presented a potential for overflow of the pond The transfer was made with permission from CDPHE (DOE, 1992)

Physical/Chemical Description of Constituents Released

The RFP Solar Ponds are often referred to in historical documents as the "high nitrate ponds " The most common characteristic of the wastes released to the Solar Ponds was high concentrations of nitrate The Solar Ponds typically had untreated process waste placed in them, but on occasion treated process waste was also placed in the ponds The RFP process waste treatment plant was designed to remove radioactive contamination of process wastes (and also

achieved some removal of metals), but it was not designed to remove nitrate The monthly history reports from the RFP waste group detailed the originating pond construction, quantity of water transferred, and activity present in the water released to the Solar Ponds These history reports also stated which of the Solar Ponds received these waters Only limited information was found on more detailed chemical analyses of the wastes released to the Solar Ponds One of these references does provide a relatively complete characterization of Pond 207A waters from the fall of 1958 The analyses available in this report cover activity of plutonium, activity of uranium, total solids, total nitrate, pH, specific gravity, aluminum, chromium (VI), fluoride, iron, magnesium, silicon dioxide, sulfate, total halides, and an extensive list of metals There are also analytical results presented for a compound R_2O_3 which is described as " the combined oxides denoted by R_2O_3 must include all those cations which are precipitated with ammonium hydroxide even in the presence of a large concentration of ammonium chloride " Of particular note in this reference is the fact that the pH range reported was 0 87 to 0 97, with an average of 0 93 The pH reported for June of 1958 was 1 21 (DOE, 1992)

The monthly history reports of the waste group also mention when other materials were placed in the Solar Ponds or handled near the Solar Ponds For instance, it is known that radioactively contaminated aluminum scrap was disposed in the Solar Ponds (see PAC 500-197), as was alcohol for at least a short time in the 1950s Also, for a period of time, waste radiography solutions were drummed for disposal in the Solar Ponds, and lithium scrap was sprayed with water for destruction of the lithium metal between the Solar Ponds For a period in late 1973 and early 1974, leachate collected from the RFP sanitary landfill was pumped to the Solar Ponds for disposal It is also known that sewer sludge, cyanide wastes and acid wastes were disposed in the Solar Ponds for at least a portion of the time the Solar Ponds have been in use The handling of these materials was non-routine, and is not thought to have comprised a major portion of the waste materials placed in these ponds (DOE, 1992)

Data have also been generated from water collected from the drainage tile and from monitoring wells near the Solar Ponds Interpretation of these data could also indicate some of the chemical constituents released by the Solar Ponds A more detailed discussion of these response actions, and the types of data that are available, is given in the next section of this narrative (DOE, 1992)

In the more recent time frame, detailed analyses of solar pond water, solar pond sludge, and groundwater in the vicinity of the Solar Ponds have been conducted The results of these analyses can be found in the RCRA closure plans for the Solar Ponds, the RFI/RI workplan for the Solar Ponds, and the groundwater monitoring reports that cover the Solar Ponds (DOE, 1992)

The volume of water that overflowed the ITPH wet well on August 7, 1989 was estimated at 50 to several hundred gallons This water was analyzed and found to contain (DOE, 1992).

pH	7 3,
Total Dissolved Solids (TDS)	2 27 mg/L,
Gross Alpha	95 $\pm$ 38 pCi/L,
Nitrate	2,200 mg/L,

Chloride	114 mg/L,
Chloroform	3 µg/L,
Carbon tetrachloride	3 µg/L,
Trichloroethene	6 µg/L,
Tetrachloroethene	1 µg/L

The water transferred in March 1990 from Pond 207B-North to Pond 207A consisted of contaminated groundwater and runoff (DOE, 1992)

Responses to Operation or Occurrence

Relining and patching of the Solar Ponds are response activities to the possibility of leakage from the Solar Ponds The relining and patching activities were conducted a number of times throughout the history of the Solar Ponds (DOE, 1992)

After installation of the drainage tile (between Pond 207A and Pond 207B) in December 1960, analysis of the water flowing from that tile became a routine daily activity The water was sampled on a daily basis for flow, temperature, total alpha activity, nitrate, and pH Typically, only gross alpha activity and flow rate were reported Flow rates in the drainage tile were variable with flows of hundreds of gallons per hour not uncommon. The chemical characteristics of the water flowing out of the pipe also varied considerably, but at times the water had elevated levels of gross alpha activity (up to thousands of picocuries per liter) These analyses from samples of water from the drainage tile can indicate some of the chemical characteristics of the constituents released; however, the analytical parameters that were evaluated on water samples collected from the drainage tile are limited in scope Similarly, the drainage tile immediately east of the 207B ponds installed in 1961 was also sampled for environmental analyses The analytical data from this sampling was presented in the Solar Pond Closure Plan of 1988 under the title of Sump 1 (DOE, 1992)

During November 1960, six groundwater monitoring wells were installed near the 207B Solar Ponds The first chemical analysis of water collected from the groundwater sampling wells in January 1961 indicated that nitrate contamination was present in the groundwater in concentrations up to 800 mg/L Sampling of the six wells became a routine activity with data reported in the waste group's history reports The analyses of water collected from these wells can indicate some of the chemical characteristics of constituents released from the Solar Ponds Once again, however, the analytical parameters that were evaluated are limited in scope (DOE, 1992)

In addition to the activities discussed above, two sumps, six trenches, and french drains were constructed in the area north of the Solar Ponds to allow the collection and return of contaminated groundwater to the Solar Ponds These actions were largely prompted by the RFP policy to keep waters in the A-series drainage below the State Public Health Service limit for nitrates in drinking water (10 mg/L) (DOE, 1992)

Removal of Pond 2 Auxilliary

Pond 2 Auxiliary was removed in preparation for the construction of Building 779 Surveys of the pond 2 Auxiliary area soil indicated readings between 2,500 to 5,000 counts per minute (cpm) Clay samples of the pond had 75,000 d/m/kg which was described as 2-1/2 times soil background in the area The proposed activity was to remove the clay lining to a depth of 6 inches This material was to be disposed of by burial in dried sewage sludge trenches (PAC 900-109, PAC NE-110, PAC NE-111 1 - NE-111 8) The pond berms were to be leveled after removal of the clay liner No documentation confirming the fate of the soil has been found (DOE, 1992)

Removal of Pond 2 and Pond 2C or 2D

Pond 2 and the earthen pond immediately east of it (Pond 2C or 2D) was removed in preparation for construction of Pond 207C in 1970 The soils potentially impacted from operation of the two referenced earthen ponds were reworked and possibly were incorporated into the berm for Pond 207C No documentation has been found indicating that radiation surveys or soil removal and disposal operations were conducted (DOE, 1992)

Sumps and Trenches

The first two sumps were activated in April 1970 Sump Number 1 was installed at the north end of the drainage tile running along the east-side of the 207B complex Sump Number 1, returned water to 207B-North Sump Number 2 was installed at the north end of the drainage tile located between Solar Ponds 207A and 207B Water from this sump was returned to 207A. Trenches 1 and 2 were installed in October 1971, Trench 3 in September 1972, and Trenches 4 and 5 in April 1974 Trench 6 was installed in July 1974 Trench 1 returned water to Sump 1 Trench 2 returned water to Sump 2 Trench 5 drained by gravity to Trench 4 Water from Trench 4 was pumped to Trench 3, and Trench 3 returned the water to Pond 207A. Trench 6 returned water directly to Pond 207A. Figure 000-2 presented in the original HRR (DOE, 1992) illustrates the final configuration of the sumps and trenches These trenches and sumps were located where seepage and nitrate concentrations were greatest

The low end of the trenches and the sumps consisted of buried 55-gallon drums Most of these drums were supplied with an electric pump and float system to automatically control the pumps The trenches consisted of a shallow excavated trench backfilled with gravel to the soil surface These trenches drained to the buried drums at the low end of the trenches This design of the trenches allowed collection of both surface and subsurface flows (DOE, 1992)

This trench system remained in operation until the early 1980s when it was replaced by a more extensive french drain system The need for the more extensive french drain system was prompted by the construction of the Perimeter Security Zone (PSZ) The PSZ is now called the Protected Area (PA) Construction of the PSZ destroyed Trenches 3 and 6 The trenches and sumps that were not destroyed in PSZ-related construction were abandoned in-place by cutting their electrical power supply (DOE, 1992)

Interceptor Trench Pump House System

The Interceptor Trench Pump House system was installed in 1980 and 1981 and is still in use The pump station is identified by a number of names at the RFP, including Main Sump, Main Nitrate Sump, Nitrate Sump, Solar Pond Sump, French Drain Sump, and others In this report, the pump station and the french drain system will be referred to as the Interceptor Trench Pump House (ITPH) The ITPH system was designed primarily to collect subsurface water Engineering drawings for the design of the ITPH system are the following Rockwell International drawings 27550-033, 27550-040, 27550-050, 27550-200, 27550-201, and 27550-202 These drawings are as-built drawings Records indicate that the ITPH system was built in April 1981 Figure 000-3 presented in the HRR (DOE, 1992) shows the configuration of the ITPH system at that time Although the ITPH system was much more extensive than the trench and sump system that it replaced, the ITPH system was extended shortly after construction of the original parts of the ITPH system It was this extension of the system that was referred to as the "Interceptor Trench (DOE, 1992) "

The ITPH system was extended due to concerns over the existence of groundwater seeps immediately north of the Solar Ponds The extension of the ITPH system consisted of a new french drain that paralleled the old Patrol Road This extension of the ITPH system was designed and built with gravel backfill from the drain to the surface so that it would collect both groundwater and surface water flow This extension also provided for the collection of footing drain flows from Building 771 and 774, through a 4-inch diameter polyvinyl chloride (PVC) pipe Engineering drawings for the design of the ITPH system extension are Rockwell International drawings 26637-01 and 26637-02 These as-built drawings indicate that the ITPH system extension was built between February and June 1982 Figure 000-4 (HRR, 1992) presents the configuration of the ITPH system following its extension with the Interceptor Trench (DOE, 1992)

This system collects groundwater and surface water runoff (from the area immediately north of the Solar Ponds and south of the new PSZ perimeter patrol road) which drains by gravity to a pump station located near North Walnut Creek. The pump station consists of a wet well and a duplex installation of self-priming pumps The ITPH pumps the collected incoming water to Pond 207B-North Water from this pond is transferred to other Solar Ponds or force evaporated in Building 374 Some of the water from 207B-North was spray irrigated in the West Spray Field (PAC 000-168) which was closed as part of the OU 11 CAD/ROD process (DOE, 1992)

Solar Pond Clean-Out

Solar pond clean-out is a response action to the presence of waste materials in the Solar Ponds and the presence of contamination in nearby soils, groundwater, and surface water Some solar pond clean-out activities were conducted to allow re-lining activities to take place, such as the re-lining of 207A in the early 1960s However, in most clean-outs conducted earlier than those given below, the waste materials were immediately re-introduced upon completion of the re-lining activities or repairs (DOE, 1992)

From fall 1976 to fall 1977, the 207B Solar Ponds were cleaned and decommissioned with respect to use for storage of process wastewater This cleanout was done in support of the water recycle program

being implemented by the RFP All three cells of the 207B pond were cleaned, but only 207B-South was relined This relining was done with a hypalon liner During these clean-out and re-lining activities, soils to the south, east and between the Solar Ponds were also removed in order to better clean the area Process waste was not re-introduced to the ponds Since the clean-out activities, these ponds have been used for reverse osmosis plant brine, treated sanitary sewage effluent, and contaminated groundwater collected by the ITPH system (DOE, 1992)

The cleanout of process waste sludge in the 207A solar pond began in 1986 with the completion of Building 788 - a pondcrete production building The removal of the process waste and sludge from 207A was completed in 1988 In 1988 the final volume of sludge was removed from 207A and the final volume of water was transferred to the 207B Solar Ponds The sludge was handled by combining the sludge with Portland cement, creating pondcrete The pondcrete has been largely stored on plantsite since its generation, but some pondcrete has been shipped off-Site for disposal In March 1990, contaminated groundwater transferred to the 207B Solar Ponds from the ITPH was placed in Pond 207A in order to prevent the over-topping of the 207B Solar Ponds All of the water present in 207A was removed during 1991 and evaporated at the Building 374 forced evaporator (DOE, 1992)

ITPH Overflow

The ITPH overflow of August 7, 1989 resulted in the filing of a RCRA Contingency Plan Implementation Report (Number 89-012) In addition to the filing of this report, additional inspection and maintenance activities were to be implemented to prevent the reoccurrence of similar problems (DOE, 1992)

Valve Vault Flooding

The valve vault flooding of October 21, 1989 was related to the transfer of solar pond water to Building 374 for evaporation. The incident resulted in the filing of a RCRA Contingency Plan Implementation Report (Number 89-015) Solar pond water in this incident was entirely contained within the valve vaults with no environmental release In addition to the report, piping repairs were made as well as piping upgrades (DOE, 1992)

Piping of Contaminated Snowmelt

On March 10, 1990 it was discovered that approximately 1,440 gallons of domestic water and contaminated snowmelt was being pumped out of a containment berm to the nearby ground In response to this incident a RCRA Contingency Plan Implementation Report (Number 90-002) was filed and controls over this type of activity were upgraded (DOE, 1992)

Transfer of Water to 207A

For the March 1990 event involving transfer of water from the 207B Solar Ponds to the 207A solar pond, a RCRA Contingency Plan Implementation Report was filed (Number 90-003) Additionally,

piping changes were made that allowed the transfer of water from the Solar Ponds to Building 374 The water transferred to 207A was to be evaporated in Building 374 (DOE, 1992)

Fate of Constituents Released to Environment

It is believed that most of the contaminants released from the Solar Ponds have contaminated soils and groundwater in the immediate vicinity of the Solar Ponds It is known that in the past some of the contaminated groundwater and seepage reached North Walnut Creek and migrated off-Site However, this migration of contamination is believed to have largely been corrected first by the installation of the trenches and sumps and later by the installation of the ITPH system. Some older studies tried to estimate the inventory of nitrate contamination in the soils north and east of the Solar Ponds Extensive groundwater and soil sampling activities have been conducted since 1986 in order to better address the fate of contaminants released to the environment from the Solar Ponds These sampling activities are discussed in the Solar Pond Closure Plans of July 1, 1988 and in the Solar Pond RFI/RI Work Plan (DOE, 1992)

Comments

A number of documents state that the routine use of the earthen Solar Ponds ceased upon completion of Pond 207A in 1956 This is not the case because the waste group's monthly reports clearly indicate routine discharges to Pond 2 (the original clay-lined solar pond) up to June 1960 An additional use of Pond 2 was made in March 1963 (DOE, 1992)

In 1988, two distinctly different sets of engineering drawings were found that pertained to the 207B solar pond re-design that occurred in the 1960 and 1961 timeframe Briefly, the difference between these two sets of engineering drawings related to whether or not underdrains would be constructed beneath the 207B Solar Ponds The set of drawings indicating underdrains beneath the 207B Solar Ponds were undated but numbered 1-8080-207 One of the drawings that had no underdrains beneath the 207B ponds is numbered 16887-1 Physical evidence observed in the field was inconclusive in determining which of the two re-designs were built Therefore, in fall 1988 one of the manholes on the drainage tile was cleaned out to determine if laterals connected with the manhole from the west The existence of such laterals would have indicated that underdrains were probably present under the 207B Solar Ponds No such laterals were found connecting with the manhole It is now understood that the 1960 Pond 207B re-design for which the bids were too high was the design for which underdrains were required The 207B re-design that was built did not have underdrains beneath the 207B ponds, but did have a drainage tile immediately east of the 207B Solar Ponds This drainage tile drained to the north, and was eventually (in the 1970s) collected by Sump 1 and pumped to 207B-North The sequence of events regarding re-design of the 207B Solar Ponds can be traced in the monthly history reports of the Waste Group at the RFP (DOE, 1992)

The installation of the sumps and trenches and later the ITPH system was a direct response to the seepage of contaminated water from the Solar Ponds In addition, documentation exists stating that overspray from the Solar Ponds on windy days contaminated areas to the east with salts that were entrained with the water from the Solar Ponds This partly accounts for the increase in the boundaries

of this PAC to the east in the original HRR. The other reasons for the proposed boundaries of the solar pond PAC included the inclusion of the area in which solar pond 2-Auxiliary existed (to the west of the southwest corner of existing solar pond 207A), as well as accounting for the entire ITPH system (including the area where the Building 771 and Building 774 footing drains daylight, just east of the old Building 774 Condensate Receiving tanks, PAC 700-1108) For these reasons, the boundaries of this PAC were originally proposed to be enlarged to include the area impacted by the solar pond water (DOE, 1992)

In approximately 1994, the solar pond PAC boundaries were reduced to incorporate only the ponds and surrounding berms This annual update reassigns the original HRR 1992 PAC boundary (see Plate 1) to incorporate the above (original) assumptions, however, the northern boundary originally selected due to the ITPH, French Drain system and suspected groundwater contamination is not reflected in this document Groundwater contamination at RFETS is addressed per RFCA by the Integrated Monitoring Program (DOE, 1996) A contaminant plume existing underneath and to the north of IHSS 101 has been delineated and is continuously monitored by the RFCA groundwater monitoring program at the perimeter Details on the groundwater monitoring program are reported annually in the Annual RFCA Groundwater Monitoring Report(s) (RMRS, 1998)

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

RMRS, 1998, *Draft 1997 Annual RFCA Groundwater Monitoring Report,* RF/RMRS-98-273 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

PAC REFERENCE NUMBER: 000-172

IHSS Reference Number	172, Industrial Area Operable Unit
Unit Name	Central Avenue Waste Spill
Approximate Location	N749,000, E2,084,000 - 903 Drum Storage Area to West dock of Building 774 via Central Avenue and Sixth Street

Date(s) of Operation or Occurrence

June 11, 1968

Description of Operation or Occurrence

A drum being transported from the 903 Drum Storage Area to Building 774 leaked, causing contamination to the roadways traveled Four 55-gallon drums, one empty and three containing liquid waste material, were transported by forklift truck from the 903 Drum Storage Area to Central Avenue, west to Sixth Street, north to Building 774, a distance of about 1.3 miles The drums were checked for integrity prior to movement and at the off-loading point The latter examination revealed that some liquid dripped from the bung hole of one drum during transit Apparently the plastic spigot on one of the full drums had been unknowingly damaged during movement. This damage allowed the contaminated solution to drip onto the roads traveled Only the west and northbound lanes were affected (DOE, 1992)

The drum leaked contaminated material at a rate of about one drop every three feet the length of Central Avenue to Sixth Street and down Sixth Street to Building 774 Roadway alpha radioactivity contamination was measured up to 100,000 cpm. One reference states that the incident resulted in radioactive contamination of approximately 140,000 disintegrations per minute (dpm) per 100 square centimeters (cm^2) on the west bound lane of Central Avenue and along Sixth Street Additionally, a 500 ft^2 area north of the west dock of Building 774 was contaminated to a level of 50,000 cpm The forklift was contaminated to a level of 100,000 cpm (DOE, 1992)

Physical/Chemical Description of Constituents Released

Discrepancies in information were found regarding the actual composition of the liquid waste material The descriptions include contaminated perclene solution, contaminated waste solvent, solvent, rinse, contaminated material, contaminated oil, contaminated wash solution, plutonium-contaminated oils, and oils with lathe coolant (consisting of 70 percent oil and 30 percent carbon tetrachloride), radioactive waste oil, and uranium oil (DOE, 1992)

Responses to Operation or Occurrence

The contaminated areas of the road were promptly barricaded The route of the forklift truck was examined and monitored disclosing small spots of contaminated drippings on the road Contaminated areas of the road were cleaned up, however, the references describing the method of cleanup are somewhat discrepant One reference denotes cleanup as diluting the contamination to a safe level Another reference states that the road was quickly washed down Another reference states that the road was washed and some of the washed surface material was placed in containers for subsequent disposal. Another reference states that some low-level material was spread to the ditch on the west side of Central Avenue Some fixed contamination still remained after washing Following cleanup activities the affected roadway was sealcoated One reference states that the street was given a coat of gravel and sealcoat (DOE, 1992)

The extent of the sealcoating is unclear Sealcoating may have been placed only on the contaminated areas of the road or on the entire distance of the westbound traffic lane (DOE, 1992)

The forklift truck was decontaminated and released Vehicles that had been on the road during the interval between movement of the drums and discovery of the leakage were surveyed and no contamination was detected (DOE, 1992)

Four barrels of contaminated soil were removed from the contaminated 500 ft^2 area north of the west dock of Building 774 (DOE, 1992)

In July 1970, as an unrelated project, a section of asphalt between Eighth and Tenth Streets on Central Avenue was replaced The old asphalt was monitored before and after removal with negative results This monitoring was performed, in part, as a response to this incident (DOE, 1992)

Some contaminated asphalt is assumed to exist in the roadway today although the degree and extent of contamination is unknown As stated above, no radioactive contamination was detected in the asphalt excavated between Eighth and Tenth Streets on Central Avenue (DOE, 1992)

Assessment of contamination associated with IHSS 172 was initiated with the OU 8 RFI/RI Work Plan (DOE, 1994a)

Fate of Constituents Released to Environment

Investigations associated with IHSS 172 were in accordance with the OU 8 RFI/RI Work Plan (DOE, 1994a) and recommendations presented in the OU 8 Technical Memorandum (DOE, 1994b) The OU 8 Technical Memorandum included the results of data compilation efforts to establish the paving history of the IHSS and an assessment of any significant realignment of the roadways or drainage ditches within the IHSS The purpose of this exercise was to identify areas of contamination that had been mitigated by implementation of routine construction activities and

paving This information was then used to focus the data needs associated with IHSS 172 characterization It was also concluded that residual contamination resulting from this release, if present, would likely be confined to the immediate vicinity of the roadway and unloading points This conclusion takes into account the small quantities of material believed to have been released (i e , less than 10 gallons) and cleanup efforts undertaken at the time of this incident (DOE, 1994b)

Based on the results of the data compilation, the recommended sampling of the IHSS 172 included the collection of three asphalt samples (one near the intersection of Central Avenue and Sixth Street and two in the Central Avenue portion of the IHSS near the 903 Pad), one surface soil sample (at the Building 774 dock area) and one vertical soil profile sample (in the northeast bound portion of Sixth Street, southeast of Building 371) (DOE, 1994b) The results are presented in the OU 8 Data Summary (DOE, 1995) With the exception of low levels (i.e , estimated concentrations less than the method detection limit) of SVOCs, only americium-241, plutonium-239/240, and sodium were detected at concentrations (activities) slightly above background in the surface soil sample (DOE, 1995) The only contaminant detected above background in the vertical soil profile sample was uranium-235 The uranium-235 activity was detected slightly above background in the vertical profile sample from the 4- to 6-inch interval. Sodium can be eliminated as a potential contaminant of concern because it is an essential nutrient Consistent with guidance provided in the RFCA Implementation Guidance Document (DOE, 1998), the chemicals represent the potential contaminants of concern associated with IHSS 172 The analytical results are summarized in Table 1 along with RFCA surface soil action levels

Table 1. Analytical results for potential contaminants of concern for IHSS 172 (DOE, 1995) and RFCA surface soil action levels (DOE, 1996)

Analyte	Concentration (units noted below)	RFCA Tier II surface soil action levels
Sample No. SS811593		
Am-241	0 047	38
Pu-239/-240	0 088	252
Benzo(a)anthracene	0 062	7 84
Benzo(a)pyrene	0 066	0 0784
Benzo(b)fluoranthene	0 083	7 84
Bis(2-ethylhexyl)phthalate	0 067	409
Chrysene	0 072	784
Fluoroanthene	0 110	$8\ 18 \times 10^4$
Indeno(1,2,3-cd)pyrene	0 040	7 84
Phenanthrene	0 069	NA
Pyrene	0 120	$6\ 13 \times 10^4$
Sample No. VP41694		
U-235	0 18	24
Radionuclide concentrations in pCi/g SVOC in mg/Kg		

Action/No Further Action Recommendation

The chemicals detected are significantly different between the sampling locations indicating that a distinguishable source of contamination associated with the release cannot be identified Additionally, analytical data for the surficial soils/ashphalt collected show that the contaminants associated with IHSS 172 are orders of below RFCA Tier II surface soil action levels For the SVOCs, the Tier II surface soil action levels (industrial use) are based on either a 1×10^{-6} cancer risk or a HI of 1 (or less) for non-carcinogenic toxicity For the radionuclides, the Tier II surface soil action levels are based on an annual dose limit of 15 millirem (mrem) to a hypothetical future resident (DOE, 1996) As a result of this comparison, it is concluded that IHSS 172 does not pose a threat to human health or the environment Additionally, a preliminary estimate of the Risk Based Ratio Sum which is used in the CDPHE Conservative Screen is 0 12 and includes both the radionuclides and organics detected For radionuclides only, the sum is equal to 0 009 For these reasons, IHSS 172 (PAC 000-172) is proposed for NFA.

Comments

It is noted that IHSS 172 overlaps with the following IHSSs 150 1, 150 2, 126 1, 126 2, 117 3, 186, and 162 Of these overlapping IHSSs, IHSS 117 3 was proposed for NFA in the Annual Update for 1997 (DOE, 1997)

Conflicting information exists regarding the destination of the drums that were being transported from the 903 Drum Storage Area. However, the majority of the references indicate the drums were transported to Building 774 In addition, a health physics report which documents the monitoring performed at the terminal destination point, shows that the monitoring was performed at the west dock of Building 774 This is also the area where 500 ft^2 of surface material was contaminated from the leaky drum (DOE, 1992)

The constituents released are believed to be predominately oil with lesser amounts of carbon tetrachloride, perchloroethylene (also known as perclene), uranium, and possibly plutonium and other contaminants In general, this description of the constituents released is consistent with descriptions presented in the Physical/Chemical Description of Constituents Released Section However, because one reference states that the last drums containing plutonium were transferred early in 1968 and transfer of drums containing uranium correspond with the first part of June 1968, it is assumed that the contamination is likely uranium. In addition, because the response to the road contamination was addition of gravel and sealcoat rather than removal, it is assumed contamination was uranium and did not contain a significant activity level (DOE, 1992)

HRR information indicates that the contaminated roadway extends around the northwest side of Building 771 to the west dock of Building 774 Also, one reference document states that the exit route traveled from the 903 Drum Storage Area to Central Avenue was from the northwest corner of the storage area onto to Central Avenue (DOE, 1992)

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1994a, *Phase I RFI/RI Work Plan for Operable Unit 8, 700 Area, Vol 1*, Rocky Flats Environmental Technology Site, Golden, CO, October

DOE, 1994b, *Operable Unit No 8 Technical Memorandum No 1 Investigations of Foundation Drains and Other Data Compilation Addendum to the Operable Unit 8 Work Plan*, Rocky Flats Environmental Technology Site, 700 Area (Operable Unit No 8), RFP/ERM-TM1-94-00011

DOE, 1995, *Operable Unit 8, Data Summary Report, 700 Area, Vol 1*, Rocky Flats Environmental Technology Site, Golden, CO, September

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1997, *Annual Update for the Historical Release Report*, RF/RMRS-98-269 UN, Revision 0, Rocky Flats Environmental Technology Site, Golden, CO, September

DOE, 1998, RFCA Appendix 3, *Final RFCA Implementation Guidance Document*, July 1998

PAC REFERENCE NUMBER: 100-608

IHSS Reference Number	NA, Industrial Area Operable Unit
Unit Name	Building 131 Transformer Leak
Approximate Location	N749,000, E2,080,000

Date(s) of Operation or Occurrence

June 3, 1989

Description of Operation or Occurrence

A pole-mounted electrical transformer located north of Building 131 leaked dielectric fluid (cooling oil) onto the ground beneath the pole The oil contained 19 ppm Polychlorinated Biphenyls (PCBs) (DOE, 1992) The cause of the leak was not identified in the documentation.

Physical/Chemical Description of Constituents Released

Approximately 0 25 gallons of oil leaked from the transformer The oil had been previously tested and found to contain 19 ppm PCBs (DOE, 1992)

Responses to Operation or Occurrence

Because one reference states that because the release contained less than the ten pound reportable quantity of PCBs and the material released contained less than the 50 ppm PCBs as regulated by the EPA, no spill cleanup would be initiated (DOE, 1992) No documentation regarding repair or replacement of the transformer was found

Fate of Constituents Released to Environment

No documentation was found which detailed the fate of the constituents to the environment however, the release was to an asphalt surface

Action/No Further Action Recommendation

Based upon the analysis of the dielectric oil containing 19 ppm, the small quantity of oil released to an asphalt surface (0 25 gal) and the age of the incident, this release is proposed for NFA. In addition, the PCB analysis for the oil was below the approved cleanup criteria (i e , 25 ppm) established in the PAM for cleanup of similar PCB sites (RMRS, 1997) The recommendation for NFA is consistent with the criteria for recommending NFA decisions presented in RFCA (DOE, 1996)

Comments

None

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

RMRS, 1997, *Closeout Report for the Source Removal of Polychlorinated Biphenyls*, RF/RMRS-97-044, Revision 0, July

PAC REFERENCE NUMBER: 400-800

IHSS Reference Number: Not Applicable, Industrial Area Operable Unit

Unit Name: Transformer 443-1

Approximate Location: N749,500, E2,082,000

Date(s) of Operation or Occurrence

Unknown

Description of Operation or Occurrence

Transformer 443-1 is located along the north wall of Building 443 The original transformer that was known to have leaked was replaced in 1987 It is presently located on a newly constructed pad that is several feet south of the older pad There is a concrete berm at ground level surrounding both the old and new site There is a second berm surrounding the new pad (DOE, 1992)

EPA representatives conducted an inspection on June 30, 1987 They found a small leak of dielectric fluid on the exterior of the transformer. The stained area was thought to be fresh because an inspection five days earlier did not detect a leak. There was no documentation found which indicated if this was the original transformer (DOE, 1992)

Physical/Chemical Description of Constituents Released

Smears taken from leaks around the top and bottom valves, level gauge, and from the bushings compartment revealed 10,964 ppm PCBs (DOE, 1992)

Responses to Operation or Occurrence

The leaky transformer was removed in 1987 (DOE, 1992)

Fate of Constituents Released to Environment

A Sitewide program was initiated in 1991 to identify known, suspect, and potential PCB contaminated sites at RFETS The study, documented in *Assessment of Known, Suspect and Potential Environmental Releases of PCBs Preliminary Assessment/Site Description,* (EG&G 1991) consisted of document and record reviews, personnel interviews, and field sampling and analysis at 37 locations These suspect locations became known as PCB sites 1-37 PAC 400-800 corresponds with PCB site 5 The analytical results for 5 samples, summarized in Table 1, indicate PCB levels in soil surrounding the pad are not in excess of the 25 ppm (total) Toxic Substances Control Act (TSCA) guidance for Restricted Access Areas at outdoor electrical

substations This guidance level for PCB contamination has been applied as the cleanup level for remediation of other PCB sites at RFETS (RMRS, 1997)

Table 1. Analytical results for potential contaminants of concern for PAC 400-800 (EG&G, 1991)

Analyte	Concentration range mg/Kg
Aroclor-1016	0 041U - 0 4U
Aroclor-1221	0 041U - 0 4U
Aroclor-1232	0 041U - 0 4U
Aroclor-1242	0 041U - 0 4U
Aroclor-1248	0 041U - 0 4U
Aroclor-1254	0 042J - 0 81U
Aroclor-1260	0 81U - 1 9
U = Not detected J = Estimated concentration below the method detection limit	

Action/No Further Action Recommendation

Analytical data for surficial soils in PAC 400-800 show that the PCB concentrations are below the 25 ppm level. This site is proposed as NFA based on these results

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

EG&G, 1991, *Assessment of Known, Suspect, and Potential Environmental Releases of Polychlorinated Biphenyls (PCBs), Preliminary Assessment/Site Description,* Rocky Flats Environmental Technology Site, Golden, CO, October

RMRS, 1997, *Closeout Report for the Source Removal of Polychlorinated Biphenyls*, RF/RMRS-97-044, Revision 0, July

PAC REFERENCE NUMBER: 400-811

IHSS Number — Not Applicable, Industrial Area Operable Unit

Unit Name — Transformer 443-2, Building 443

Location — N749,500, E2,082,000

Date(s) of Operation or Occurrence

April 1992

Description of Operation or Occurrence

Transformer 443-2 is located near the southwest corner of Building 443 The transformer was observed leaking small quantities of oil during a routine inspection in April of 1992 The area is surrounded by a concrete berm and the area restricted by a fence (DOE, 1993)

This site was not originally sampled as part of the Sitewide screening effort to categorize the 35 suspected PCB sites in August of 1991 (EG&G 1991) However, the surrounding soil was sampled in the same manner as the sites included in the assessment in September of 1991 as requested by the Utilities Department for an electrical upgrade construction project (DOE, 1993)

Physical/Chemical Description of Constituents Released

Analytical data show PCB contamination was present in soils surrounding the transformer at 230 ppm Radiological samples collected at the same time were analyzed and indicate background levels of plutonium, uranium, and americium. Wipe samples collected from the outside of the transformer in April 1992 indicated that the present dielectric oil was PCB-contaminated at 2,000 $\mu g/100\ cm^2$ (outside) Oil samples were also analyzed in April 1992 and show that the oil contained 12,000 ppm PCBs (DOE, 1993)

Responses to Operation or Occurrence

The transformer was taken out of service in April 1992 and notification was made to DOE at the time of the incident (DOE, 1993) The transformer and dielectric fluid were disposed in February 1993 (EG&G, 1993) Excavation of the area, which included the PCB-contaminated pad and soil, commenced in July 1993

Fate of Constituents Released to Environment

Five samples were collected to verify cleanup and the analytical results are summarized in Table 1 The results indicate PCB levels in the soil are not in excess of the 25 ppm (total) TSCA guidance for Restricted Access Areas at outdoor electrical substations This guidance level for PCB

contamination has been applied as the cleanup level for remediation of other PCB sites at RFETS (RMRS, 1997)

Table 1. Analytical results for potential contaminants of concern for PAC 400-811 (Weston, 1993)

Analyte	Concentration range mg/Kg
Aroclor-1016	0 040U - 2 2U
Aroclor-1221	0 040U - 2 2U
Aroclor-1232	0 040U - 2 2U
Aroclor-1242	0 040U - 2 2U
Aroclor-1248	0 029J – 3 6
Aroclor-1254	0 080U - 4 3U
Aroclor-1260	0 080U - 4 3U
U = Not detected J = Estimated concentration below the method detection limit	

Action/No Further Action Recommendation

Analytical data for soils in PAC 400-811 show that the PCB concentrations are below 25 ppm. The results are below the 25 ppm (total) TSCA guidance for Restricted Access Areas at outdoor electrical substations This guidance level for PCB contamination has been applied as the cleanup level for remediation of other PCB sites at RFETS (RMRS, 1997) This site is proposed as NFA based on these results

Comments

None

References

DOE, 1993, *Quarterly Update for October 1, 1992 through January 1, 1993, Historical Release Report*, Rocky Flats Environmental Technology Site, Golden, CO, January

EG&G, 1991, *Assessment of Known, Suspect, and Potential Environmental Releases of Polychlorinated Biphenyls (PCBs), Preliminary Assessment/Site Description,* Rocky Flats Environmental Technology Site, Golden, CO, October

EG&G, 1993, Correspondence to R M Nelson, Jr from A.L Schulbert, Toxic Substances Control Act Program Accomplishments for February 1993 – ALS-100-93

RMRS, 1997, *Closeout Report for the Source Removal of Polychlorinated Biphenyls*, RF/RMRS-97-044, Revision 0, July

Weston, 1993, PCB analytical results for cleanup verification samples, 10/29/93

PAC REFERENCE NUMBER: 500-169

IHSS Reference Number 169, Industrial Area Operable Unit

Unit Name Waste Drum Peroxide Burial

Approximate Location N749,500, E2,083,000

Date(s) of Operation or Occurrence

April 1981

Description of Operation or Occurrence

During the week ending April 24, 1981, warehouse personnel were transporting three 55-gallon drums of hydrogen peroxide when two of the drums fell off a pallet According to one reference, one of the drums burst open and the peroxide drained into a culvert at the corner of Fifth and Central Avenues A second reference states that in April 1981, a 55-gallon drum of 35% hydrogen peroxide solution spilled at the warehouse (no associated building number is given) The content of the drum leaked out and was flushed into a hole with water According to the RCRA 3004(u) Report, a 55-gallon drum of hydrogen peroxide was buried in the chemical storage area east of Building 551 (DOE, 1992)

Physical/Chemical Description of Constituents Released

A solution of 35% hydrogen peroxide (H_2O_2) was released to the environment (DOE, 1992)

Responses to Operation or Occurrence

A hole was excavated east of Fifth Avenue, in the Central Avenue Ditch The Fire Department then hosed down the area allowing the diluted peroxide to drain into the hole The hole was refilled on April 23, 1981 (DOE, 1992)

Fate of Constituents Released to Environment

As presented in DOE (1992), the incident described is believed to be the same as the incident discussed as IHSS 191 (PAC 400-191) As discussed in the HRR, the documentation indicating a 55-gallon drum of hydrogen peroxide was buried in the chemical storage yard was considered suspect and additional documentation was not found which corroborated this report (DOE, 1992) Research during the preparation of the Phase I RFI/RI Work Plan for OU 13 (EG&G, 1992) did not reveal any additional information to substantiate the burial described as IHSS 169 In addition, it was concluded in the Work Plan and the Technical Memorandum 1, Addendum to the Field Sampling Plan, OU 13 (DOE, 1994) that regardless of the location, a release or potential

release of hydrogen peroxide does not constitute a threat to human health of the environment (DOE, 1995)

Action/No Further Action Recommendation

Consistent with findings presented in DOE (1992) and the Phase I RFI/RI Work Plan, OU 13 (EG&G, 1992), Technical Memorandum, and Data Summary, IHSS 169 is proposed as NFA.

Comments

IHSS 191 was proposed as NFA in 1997 (DOE, 1997) because of the relatively small amount of hydrogen peroxide spilled, the neutralization effect over time, and no threat of adverse health effects

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1994, *Technical Memorandum 1, Addendum to the Field Sampling Plan, OU 13,* Rocky Flats Environmental Technology Site, Golden, CO,

DOE, 1995, *Draft Operable Unit 13 Data Summary No 2 100 Area,* RFP/ERM-95-009, Revision 0, Rocky Flats Environmental Technology Site, Golden, CO,

DOE, 1997, *Annual Update of the Historical Release Report*, RF/RMRS-97-073 UN, Rev 0 Rocky Flats Environmental Technology Site, Golden, CO, September

EG&G, 1992, *Phase I RFI/RI Work Plan for OU 13, 100 Area,* 21100-WP-OU13 01, Revision 0, Rocky Flats Environmental Technology Site, Golden, CO, October

PAC REFERENCE NUMBER: 700-118.1

IHSS Reference Number	118 1, Industrial Area Operable Unit
Unit Name	Multiple Solvent Spills West of Building 730
Approximate Location	N750,600, E2,083,750

Date(s) of Operation or Occurrence

Prior to 1970s - June 18, 1981

Description of Operation or Occurrence

A 5,000-gallon underground carbon tetrachloride storage tank was located adjacent to the west side of Building 730 In the 1960s, 1970s, and 1980s, tank overflows and spills occurred Persons interviewed for the Comprehensive Environmental Assessment & Response Program (CEARP) report recalled a spill of 100 to 200 gallons of TCE north of Building 776 prior to 1970 These persons did not recall any cleanup operations It has been postulated that this spill may have been carbon tetrachloride (DOE, 1992)

On February 26, 1976, corroded piping leaked carbon tetrachloride into the tank's sump pit A "considerable" quantity leaked and was subsequently pumped out of the pit onto the ground Another document indicates this leak was the result of a leaking valve (DOE, 1992)

In March 1976, a small amount of leakage from the pipes in the tank pit was evident At that time, Health Sciences was continuing soil-gas monitoring beneath the end tank Industrial Hygiene reported air samples were typically averaging 10 mg/L carbon tetrachloride During the month prior to April 15, 1976, the average concentration rose to near 2,000 mg/L It was postulated that the tank or its associated pipes in the sump could have been releasing the carbon tetrachloride into the ground (DOE, 1992)

On June 18, 1981, the tank failed releasing carbon tetrachloride into the sump The sump subsequently pumped some of the liquid out onto the ground surface Temporary storage tanks were to be obtained to collect the liquid No documentation was found which details the actual use of the temporary storage tanks (DOE, 1992)

This underground tank had its long axis running north-south, with the south head of the tank exposed in a valve pit and the remainder was buried directly in soils The base of the tank was located at an approximate elevation of 5978 feet (approximately 9 1 feet below grade) and the base of the valve pit was at an elevation of 5976 0 feet (approximately 10 25 feet below grade) The east side of the carbon tetrachloride tank valve pit was approximately 10 1 feet west of the exposed portion of the Building 730 pump house (DOE, 1992)

The carbon tetrachloride tank was later removed, but no written documentation of this removal has yet been found (DOE, 1992)

Physical/Chemical Description of Constituents Released

The underground carbon tetrachloride tank was used to store raw carbon tetrachloride for use in plant operations TCE has also been described as the constituent released to the environment in the incident prior to 1970 Other sources indicate carbon tetrachloride rather than TCE was released to the environment (DOE, 1992)

Responses to Operation or Occurrence

Persons interviewed for CEARP recalled no mitigation efforts to control the spill prior to 1970 No documentation was found which detailed response to spills which occurred during filling operations in the 1970s (DOE, 1992)

In the winter and spring of 1976, there were efforts to stop the leakage from the pipes Documentation was found which detailed the cleanup of spilled liquid, including that pumped onto the ground (DOE, 1992)

In February 1976, Industrial Hygiene showed interest in having the underground storage tank replaced with an above ground tank At this time, Health Sciences was monitoring a pipe installed below the end of the tank for airborne carbon tetrachloride and found no indications of problems with the tank itself No documentation was found which detailed response to high concentrations of carbon tetrachloride detected during April 1976 soil-gas monitoring (DOE, 1992)

The tank was removed following its failure in 1981 A Building 776 employee present at the time of the tank's removal recalled that it appeared sound with no obvious leaks or significant corrosion (DOE, 1992)

Investigation of IHSS 118 1 was initiated with the implementation of the OU 8 RFI/RI Work Plan (DOE, 1994) Data collected in support of these activities were summarized in the OU 8 Technical Memorandum No 1 (DOE, 1994) and the OUs 8 and 9 Data Summary Reports (DOE, 1995a and 1995b)

A pre-remedial investigation of IHSS 118 1 was conducted in September 1997 to determine the extent of the free-phase carbon tetrachloride plume and define the bedrock surface in the area to determine the shape of the prior excavation (RMRS, 1997)

Fate of Constituents Released to Environment

Results from the investigations cited above indicate that carbon tetrachloride migrated below the water table and accumulated in the bedrock depression encompassing a group of subsurface process waste tanks located adjacent to the former carbon tetrachloride tank The carbon

tetrachloride partially displaced the groundwater to create a zone of dense non-aqueous phase liquid (DNAPL) in the heterogeneous fill material Because the DNAPL zone is surrounded by low permeability bedrock, the DNAPL is confined to the bedrock depression (RMRS, 1998a)

Action/No Further Action Recommendation

The results of an alternative analysis for short-term remedy of IHSS 118 1 (RMRS, 1998a) indicate that the best approach to address near-term risk is to monitor natural attenuation of the contamination Monitored natural attenuation was selected because more aggressive remedial technologies were not implementable at this time A sampling and analysis plan for monitoring the natural attenuation has been issued in draft (RMRS, 1998b) Long-term or future action may include source removal or soil/groundwater remediation

Comments

Retiree interviews conducted during the investigation found that at least two major spills occurred during tank filling operations In the late 1970s, the sight gauge used to indicate the level of the contents in the tank malfunctioned, and showed that the tank was nearly empty The nearly full tank was refilled, and up to 1,000 gallons of carbon tetrachloride was spilled onto the ground The spilled carbon tetrachloride flowed in the gutter and along the street north of Building 776 (south of Building 701), then flowed to the north along the west side of Building 701 towards Building 771 On a later occasion, another sight gauge malfunctioned, the tank was again overfilled and about 200 to 300 gallons of carbon tetrachloride was spilled through the vent pipe onto the ground While the tank may have also leaked, based on the volume of carbon tetrachloride spilled on the surface, the spills are the most likely cause of the detected DNAPL (RMRS, 1997)

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO June

DOE, 1994, *Technical Memorandum 1, Investigations of Foundation Drains and Other Data Compilations, Addendum to the Operable Unit 8 Work Plan*, Rocky Flats Environmental Technology Site, Golden, CO Draft Final

DOE, 1995a, *Operable Unit 8, Data Summary Report, 700 Area, Vol 1*, Rocky Flats Environmental Technology Site, Golden, CO, September

DOE, 1995b, *Draft Data Summary 2, Operable Unit No 9, Outside Tanks*, Rocky Flats Environmental Technology Site, Golden, CO, October

EG&G, 1994, *Phase I RFI/RI Work Plan for Operable Unit 8, 700 Area* 21100-WP-OU-8 01 EG&G Rocky Flats, Inc , Golden, Colorado

RMRS, 1997, *Sampling and Analysis Plan for the Pre-Remedial Investigation of IHSS 118 1* RF/RMRS-97-059, September

RMRS, 1998a, *Final Technical Memorandum No 1, Monitored Natural Attenuation of IHSS 118 1*, RF/RMRS-97-094 UN, Rocky Flats Environmental Technology Site, Golden, CO,

RMRS, 1998b, *Draft Sampling and Analysis Plan for Monitoring Natural Attenuation at IHSS 118 1*, RF/RMRS-98-252, Rocky Flats Environmental Technology Site, Golden, CO, August

PAC REFERENCE NUMBER: 700-150.5

IHSS Reference Number	150 5, Industrial Area Operable Unit
Unit Name	Radioactive Site West of Building 707 (IAG Name Radioactive Leak West of Building 707)
Approximate Location	N750,000, E2,084,000

Date(s) of Operation or Occurrence

1953 - 1983

Description of Operation or Occurrence

All documented leaks in the area west of Building 707 are related to the overflow of Valve Vault 7 (PAC 700-123 1) and an original process waste line valve vault (believed to be IHSS 150 5) removed from the area in March 1973 (see also PAC 700-123 2) (DOE, 1992)

Physical/Chemical Description of Constituents Released

The primary constituents released for PACs 123 1 and 123 2 and 150 5 were process wastewater from the 800 and 400 Areas which may have contained uranium, solvents, oils, beryllium, nitric acid, hydrochloric acid, and fluoride (DOE, 1992)

Responses to Operation or Occurrence

The responses to overflow incidents of Valve Vault 7 and the original process waste line valve vault are discussed in PAC 700-123 1 and PAC 700-123 2, respectively (DOE, 1992) As presented in DOE (1997) and documented in the OU 8 Data Summary Report (DOE, 1995), IHSS 123 1 was sampled in seven locations for inorganics, radionuclides, VOCs volatile organic compounds, and semi-volatile organic compounds There were no detections with the exception of benzo(a)pyrene which was present in the sample but below the method detection limit (MDL) IHSS 123 1 was recommended for NFA in the 1997 Annual Report (DOE, 1997)

Fate of Constituents Released to Environment

As presented in DOE (1992), the incident related to IHSS 150 5 is believed to be the same as the incident discussed for IHSSs 123 2 Research during the preparation of the Phase I RFI/RI Work Plan for OU 8 (DOE, 1994) did not reveal any additional information to substantiate releases in the area designated as IHSS 150 5 In addition, IHSS 150 5 was noted in RFCA, Attachment 4 as "the same as IHSS 123 2" and was not ranked separately (DOE, 1996)

Action/No Further Action Recommendation

Consistent with findings presented in DOE (1992), the Phase I RFI/RI Work Plan for OU 8 (DOE, 1994) and as presented in RFCA (DOE, 1996), IHSS 150 5 is proposed as NFA (to clarify the duplication) and because the area of IHSS 150 5 warrants further investigation due to releases associated with IHSS 123 2

Comments

IHSS 150 5 has been re-located as originally marked in the HRR (DOE, 1992) onto Plate 2 Proposed NFAs for documentation and tracking

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1995, *Operable Unit 8, Data Summary Report, 700 Area, Vol 1,* Rocky Flats Environmental Technology Site, Golden, CO, September

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1997, *Annual Update for the Historical Release Report*, RF/RMRS-97-073 UN , Rocky Flats Environmental Technology Site, Golden, CO, September

EG&G, 1994, *Phase I RFI/RI Work Plan for Operable Unit 8, 700 Area, Vol 1,* Rocky Flats Environmental Technology Site, Golden, CO, October

PAC REFERENCE NUMBER: 900-108

IHSS Reference Number 108, Buffer Zone Operable Unit

Unit Name Trench T-1

Approximate Location N749,500, E2,086,000

Date(s) of Operation or Occurrence

November 1954 - December 1962

Description of Operation or Occurrence

Approximately 125 drums of depleted uranium chips and lathe coolant are buried in a trench approximately 200 ft long, 15 ft wide, and 5 ft deep The trench is located west of Gate 9 in the eastern side of the 400-acre manufacturing area of the plant The drums were covered with two feet of soil and the corners of the trench were marked (DOE, 1992)

As summarized in DOE (1992), drums buried in Trench T-1 were from Building 444 and off-Site sources The length of the trench was extended in December 1955 Memoranda authorizing the use of the trench and the nature of its contents are detailed in a report entitled A Summary of On-Site Radioactive Waste Disposal, E A. Putzier, April 22, 1970 (Putzier, 1970)

At the time this material was buried, RFP policy permitted off-Site uranium transportation in the form of uranium oxide Because most of the uranium was contaminated with numerous inert materials, it would not readily oxidize, therefore preventing shipment On-Site burial was a suitable alternative at the time (DOE, 1992)

A report from November 1954 described a procedure for placing 30-gallon drums of combustible material inside 55-gallon drums of graphite Six of these drums were placed in a trench described as being located in the same area as Trench T-1 It is unclear whether this was the burial method for all drums in the trench (DOE, 1992)

In October 1982, a metal drum was punctured during routine weed cutting The drum was found to contain a mixture of water and oil The liquid was pumped into a new drum and transferred to await disposal The drum was to have been excavated and transferred to size reduction Another account of a 1982 event may describe the same or a similar incident involving two drums uncovered by weed cutting activities One drum reportedly contained an oily sludge with 4 3 picoCuries per gram (pCi/g) plutonium and 1 2 microcuries per gram (μCi/g) uranium (DOE, 1992)

Physical/Chemical Description of Constituents Released

Approximately 25,000 kilograms of depleted uranium chips were contained in the estimated 125 buried drums (DOE, 1992)

An inventory receipt records 38 drums disposed in the trench from November 17, 1954 to June 1, 1956 Most of the records indicate the contents to be metal turnings and still bottoms (residue from a distillation process), although 10 drums contained cemented cyanide waste The drums of concreted cyanide were placed in the same trench as highly combustible waste from Building 444 Copper alloy was also contained in some drums (DOE, 1992)

Inventory lists indicating the number of drums of oil disposed by on-Site burning or burial and the origin of the drums are available from April 1954 through April 1966 with the exception of a gap from August 1957 through August 1958 Eighty-five of the estimated 125 drums are documented in this record (DOE, 1992)

Two drums of "special" wastes from Building 444 which were placed in the trench in 1955 were removed and returned to Building 444 in 1956 at the request of the Accountability Group (DOE, 1992)

In 1958, authorization was granted for the additional disposal in the trench of over 15,000 pounds of depleted uranium chips from Building 444 In 1962, authorization was given for the disposal of approximately 7,500 pounds of depleted uranium chips It is unclear whether this entire amount was buried in the trench or in the nearby Mound Site (PAC 900-113) (DOE, 1992)

Responses to Operation or Occurrence

A radiometric survey was performed in the area in October 1977 and identified four small hot spots ranging from 500 to 18,000 cpm of activity The spots were marked and mapped A radiometric survey was performed in June 1980 identifying numerous hot spots suspected to be depleted uranium Two boxes of uranium-contaminated soil were removed from the southeast corner of the Perimeter Security Zone (PSZ) in the spring of 1982 during construction of the PSZ Monitoring wells were installed in October 1987 (DOE, 1992)

In the summer of 1995, electromagnetic surveys and ground penetrating radar confirmed the presence of drums and/or metallic objects in the Trench T-1 location The surveys indicate that a majority of the metallic objects were located in the westernmost half of the trench (DOE, 1997)

Revision 5 of the PAM to remediate the site as part of a CERCLA Accelerated Source Removal Action was approved by the Agencies in April 1998 (RMRS, 1998a) The source removal action was initiated on June 10, 1998 and completed on August 20, 1998 The action included the excavation of materials buried in the trench and segregation of material during excavation and packaging of the waste streams based on waste type The excavated trench length was 230 ft with 160 drums of depleted uranium and 10 drums of cemented cyanide removed from the

excavation At present all Trench 1 waste is being stored in an area on the north side of the Trench 1 project site and storage within the Temporary Unit meets the substantive requirements of RCRA and TSCA (RMRS, 1998b)

Because VOCs and PCBs were detected at or above regulatory thresholds (i.e , RCRA, TSCA) in the drums of depleted uranium, the material could not be shipped to the treatment subcontractor for recycle as indicated in the PAM (RMRS, 1998a) The Trench 1 waste will remain in interim storage until a treatment process can be identified and the waste can be treated for off-Site disposal (RMRS, 1998b)

Fate of Constituents Released to Environment

The removal action was completed and verification samples were collected from the excavation bottom and sidewalls Sampling was performed in accordance with the Sampling and Analysis Plan to Support the Source Removal at the Trench T-1 Site, IHSS 108 (RMRS, 1998c) Samples were collected and analyzed for radionuclides by gamma spectroscopy, VOCs, PCBs (as appropriate), and cyanide (as appropriate) Based on preliminary (i.e , un-validated) results, the Performance Measure Closure Report (RMRS,1998b) concluded that the trench has been successfully remediated relative to RFCA action levels and cleanup levels as specified in the PAM (RMRS, 1998a)

Sampling of the clean soil stockpile (segregated using a FIDLER and organic vapor analyzers during excavation) was performed in accordance with the Sampling and Analysis Plan (RMRS, 1998c)

Preliminary results (i e , un-validated) indicate, using the 95% Upper Confidence Level, that RFCA Tier II subsurface soil action levels and the cleanup levels specified in the PAM have been met The clean soil stockpile can be returned to the excavation.

Action/No Further Action Recommendation

A source removal action was completed in the summer of 1998 This action was authorized by an Agency approved PAM for the Source Removal at the Trench 1, IHSS 108 (DOE, 1998) A completion report for the project is under preparation. The completion report will detail the waste and contaminants removed, the condition of the excavation following the removal action, the waste storage and treatment processes, and sample analytical results It is anticipated that NFA will be proposed for IHSS 108 based on the final sampling results that will be presented in the completion report

Comments

None

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1997, *Annual Update for the Historical Release Report*, RF/RMRS-97-073 UN , Rocky Flats Environmental Technology Site, Golden, CO, September

RMRS, 1998a, *Final Proposed Action Memorandum for the Source Removal at Trench 1, IHSS 108*, RF/RMRS-97-001, Rocky Flats Environmental Technology Site, Golden, CO, February

RMRS, 1998b, *Trench 1 Source Removal Project, IHSS 108, FY 98 Performance Measure Completion Report*, Rocky Flats Environmental Technology Site, Golden, CO, September

RMRS, 1998c, *Sampling and Analysis Plan to Support the Source Removal at the Trench T-1 Site, IHSS 108*, RF/RMRS-98-205 Rocky Flats Environmental Technology Site, Golden, CO, April

PAC REFERENCE NUMBER: 900-112

IHSS Reference Number 112, Buffer Zone Operable Unit

Unit Name 903 Pad

Approximate Location N749,000, E2,086,000

Date(s) of Operation or Occurrence

1955 or 1958 - June 1968

Description of Operation or Occurrence

Drums were stored in the 903 Drum Storage Area (903 Pad) since the summer of 1958 when drums from the "east pad" of Building 444 (PAC 600-1001) were found to be leaking The contents of the drums were transferred to drums that were then placed in the 903 Pad A 1955 aerial photograph clearly shows some activity on the 903 Pad although no supporting documentation was found which identifies the nature of this activity Drums were leaking and rusting in storage at the 903 Pad in December 1959 By November of 1960, significant leaking was noted from the drums in storage, many drums became empty while in storage (i.e , the contents had entirely leaked out) These drums were placed on pallets on the ground These drums originated from the process buildings (DOE, 1992)

Beryllium-contaminated liquid waste, uranium-contaminated waste, and some unknown high-level contaminated solid waste were stored in the "back" area of the 903 Pad in a locked enclosure from February 1962 until at least June 1963 This waste was owned by Coors Porcelain Company and was stored under the agreement that Coors was responsible for transportation, unloading and loading, and competence of the drums Monthly accounts for the acceptance and removal of the waste are detailed in the History Reports of the Waste Disposal Co-Ordination Unit since the first shipment was received (DOE, 1992)

The first drum leaking in the storage area was identified in 1959 at which time a rust inhibitor (ethanolamine) was added to solvents when drums were filled In 1960, leakage from drums had contaminated areas under the drums and about ten feet from the drums (DOE, 1992)

In August 1967, heavy rains resulted in the spread of plutonium contamination from the waste oil drums in the 903 area, prompting the initiation of the closure of the area (DOE, 1992)

During the drum-removal activities in June 1968, one drum of contaminated waste was punctured en route to Building 774 for treatment The leak resulted in approximately one drip every three feet down Central Avenue and Sixth Street The road material was seal-coated The pathway was designated in the IAG as IHSS 172 (PAC 000-172) (DOE, 1992)

Physical/Chemical Description of Constituents Released

It has been estimated that approximately 150 grams (g) of plutonium leaked into the soil with approximately 23 g covered by the asphalt pad, 94 g within the plant boundary, and 33 g in soil outside of the boundary In other units, approximately 4 38 curies (Ci) of plutonium is under the asphalt pad and 4 25 Ci spread over 2 72 square kilometers Some of the soil around the pad has been remediated (PAC 900-155) (DOE, 1992)

By mid-1962, an area 5 by 25 ft had activity levels greater than 100,000 cpm There were an estimated 1,500 drums in storage with many having rusted through and leaked empty An estimate of 50 to 60 percent of the drums in storage were "badly corroded" and a recommendation was made to dispose of them in the "very near future" (DOE, 1992)

Transfer of contaminated oil from the drum storage area was completed in May 1968 Contamination migrated due to wind and rain Approximately 50 of the drums in storage were empty, the contents having leaked entirely (DOE, 1992)

Responses to Operation or Occurrence

Monitoring of the area was performed periodically however, no information could be found describing what type of monitoring Contaminated areas around the leaking waste drums detected in 1964 were covered with fill dirt as a temporary measure Signs warning of contamination were then posted In November 1964, fencing was placed around the drum storage area for rabbit control and to enclose the contaminated soil Air samplers at the east fence detected contamination following high winds (DOE, 1992)

In August 1967, soil and rocks contaminated by rainwater runoff from the fenced area (east and downgradient of the storage area) were shoveled up and deposited inside the fence An attempt was made to re-grade the surface to prevent a recurrence of the contamination spread (DOE, 1992)

Building 903 was constructed in 1966 to filter and transfer contaminated oil from leaking drums The building was used to pre-filter the oil from the drums on the 903 Pad that could not be safely moved to Building 774 Oil filtered in Building 903 was then transferred to Building 774 for final processing The pre-filtering process was considered too time consuming and the step was eliminated several months after it began (DOE, 1992)

In November 1968, six contaminated holding tanks located outside of Building 903 and used in the filtering process were disconnected and crated for shipment as radioactive waste The radioactively contaminated fence from around the 903 Pad was also shipped off-Site as were two forklifts used in the drum transfer activity Building 904 which had been adjacent to Building 903 was moved to a location east of the Fire Barn (Building 331) Building 903 was moved to a location immediately east of Building 666 (DOE, 1992)

Drum removal from the area began in January 1967 for drums that were in the storage area for six months or less In June 1968, the drums and pallets were cleared from the area and shipped off-Site in waste boxes The 100,000 ft^2 area was contaminated with activities ranging from 2,000 to 300,000 dpm per 100 cm^2 Depth of contamination was to 8 inches or more, possibly up to 18 inches Vegetation was burned off the area in October 1968 in preparation for soil remediation (DOE, 1992)

The soil in the area exhibiting the greatest contamination was covered with fill, a base course, soil sterilant, asphalt prime coat, and asphalt from July to November 1969 The area covered with asphalt was 146,150 ft^2 Four shallow wells were drilled in November 1969 for monitoring purposes Adjacent areas, specifically, but not limited to, the southeast, had high activity in surficial soils The soil to the southeast that had the highest activity readings indicated by several surveys was removed and is part of PAC 900-155 Soil to the east was also impacted by the 903 Pad (PAC 900-213) (DOE, 1992)

Modification to the topography in and around the 903 Pad was completed in April 1971 to allow runoff to flow into Pond C-1 on Woman Creek (DOE, 1992)

Additional wells and boreholes were installed in 1987 for subsequent monitoring of the groundwater and soil. Monitoring in the alluvial groundwater system has indicated elevated values of TCE, PCE, and carbon tetrachloride with concentrations in two wells on the 903 Pad at approximately 10 percent solubility for PCE and carbon tetrachloride. Concentrations at these levels are considered indicative of a DNAPL source Concentrations of VOCs equal to or above RFCA Tier I subsurface soil action levels were observed in subsurface soil during the installation of these wells Elevated volatile organic compounds are detected approximately 600 ft southeast and 1,500 ft northeast of the 903 Pad, indicating a groundwater plume from the suspected source area. These constituents are typical of the materials contained in the drums stored in the area but are also representative of contaminants associated with Trench No 1 (PAC 900-108), the Mound Area (PAC 900-113), and Oil Burn Pit No 2 (PAC 900-153) Certain inorganic constituents and radionuclides were detected above background values but do not comprise a well-defined plume of contamination (DOE, 1992)

Fate of Constituents Released to Environment

It was determined in 1971 that the pad area presented no immediate public health hazard and that the plutonium contaminated soil under and around the pad would be removed eventually (DOE, 1992) The Sampling and Analysis Plan for the Characterization of the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1997) is being implemented in 1998 and 1999 to further characterize and refine the volume of soils exceeding RFCA Tier I action levels for radionuclides and VOCs Results from the characterization will aid in the assessment of remedial alternatives (DOE, 1997)

Action/No Further Action Recommendation

As discussed above, IHSS 112 is currently undergoing characterization As of August 31, 1998, 25 boreholes to characterize radiological contamination and 2 deep boreholes to characterize VOC contamination have been completed on the 903 Pad Additionally, 80 in-situ High Purity Germanium (HPGe) detector measurements have been performed in areas adjacent to the Americium Zone per the Sampling and Analysis Plan for the Characterization of the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1997) When characterization is complete, the findings will be presented in a Site Characterization for the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone

Comments

None

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1997, *Annual Update for the Historical Release Report*, RF/RMRS-97-073 UN , Rocky Flats Environmental Technology Site, Golden, CO, September

Putzier, 1970, Memoranda authorizing the use of the trench and the nature of its contents are detailed in a report entitled A Summary of On-Site Radioactive Waste Disposal, E A. Putzier, April 22, 1970

RMRS, 1997, *Sampling and Analysis Plan for the 903 Drum Storage Area (IHSS 155), Lip Area (IHSS 155) and Americium Zone,* RF/RMRS-97-084

PAC REFERENCE NUMBER: 900-119.1

IHSS Reference Number	119 1, Operable Unit 1
Unit Name	West Scrap Metal Storage and Solvent Spill Area
Approximate Location	N748,000, E2,085,000

Date(s) of Operation or Occurrence

September 1968 - November 1971

Description of Operation or Occurrence

This area was one of two sites used for scrap metal storage in the southeast portion of the 400 acre manufacturing area PAC 900-119 1 was the western site located on a flat area just north of the Southeast Perimeter Road In September 1968, arrangements were made to move a scrap metal pile (PAC 900-119 2) from its location near the lithium disposal pit (PAC 900-140) to a new area 200 yards to the west in an attempt to limit traffic through the area Aerial photographs reveal the storage of material in piles and rows in both 1969 and 1970 Some of the material stored may have been in drums The scrap metal was stored for eventual recycle off-Site (DOE, 1992)

Physical/Chemical Description of Constituents Released

Pieces of scrap metal from various buildings on Site may have had residual oils and/or hydraulic coolants on them which could have dripped off into the soil. Higher than normal air samples in November 1971, were attributed to the bulldozing of the area during cleanup activities to disposition the scrap metal. Three radiological "hot spots" were found during a routine radiometric survey in August 1981 (DOE, 1992) Two additional radiological "hot spots" were identified during Phase III Final RFI/RI investigations in 1994 (DOE, 1995b)

Further investigation during source removal activities (see below) show that the hot spot dimensions were determined to be approximately 10 inches in diameter and 12 inches deep, with plutonium activities ranging from 10 nanoCuries per gram (nCi/g) (surface) to 50 pCi/g (at 1 foot) (DOE, 1994a)

Response to Operation or Occurrence

The area south of the 903 Pad was cleaned up in December 1971 and disturbed soil was re-vegetated in the following spring Groundwater samples collected from monitoring wells installed in the area in 1974 had anomalous concentrations of uranium and nitrate Additional test holes were drilled in April 1982 to attempt to locate buried materials that might have been contributing

leachate into the well waters No buried debris was located but several of the test holes were maintained as test sites for water sampling during the three subsequent months (DOE, 1992)

A recovery well was located within the IHSS 119 1 in 1993 to extract VOC-contaminated groundwater localized in the southwest portion of the IHSS The recovered groundwater was and continues to be sent to the Building 891 water treatment system which uses ultraviolet light with the addition of hydrogen peroxide to catalyze the breakdown of contaminants to innocuous chemicals (DOE, 1995a)

In 1994, an Accelerated Response Action (ARA) consisting of the removal of radionuclide contaminated soils ("hot spots") at five specific locations within IHSS 119 1 and one location within IHSS 119 2 was conducted The "hot spots" were localized shallow contaminated soils that contained substantial activities of either plutonium/americium or uranium, as well as traces of several organic compounds The ARA included excavation, containerization, storage, and disposal of twenty-one 55-gallon drums of radionuclide contaminated soil. The drums were disposed at the Envirocare facility in Utah which is permitted to accept mixed low-level wastes The source removal of contaminants from these hot spot areas reduced potential risks by several orders of magnitude and are below 10^{-4} (DOE, 1995b)

In addition to the ARA, the proposed remedial action to be taken within IHSS 119 1 was agreed upon in 1995 through the Dispute Resolution process as described in the IAG The selected remedial alternative for IHSS 119 1 was to excavate soils contaminated with VOCs above the RFCA Tier I Subsurface Soil Action Levels, treat these soil by thermal desorption, and return the treated soils to the excavation. The decision was documented in the CAD/ROD for OU 1 (DOE, 1997)

Additional sampling within IHSS 119 1 was conducted in June 1997 to support implementation of the selected remedial alternative (RMRS, 1997) Three geoprobe borings were located within each of the two source areas identified in the CAD/ROD No significant VOC contamination was observed in any of these borings In response, four additional geoprobe borings were placed in the two source areas In the 51 samples collected for the 10 borings placed only one contaminant (PCE) exceeded the detection limit and none of the sample results were above the RFCA Tier I Subsurface soil Action Levels (RMRS, 1997) Based on these findings an amendment to the CAD/ROD is being prepared that will modify the remedial action for the IHSS

Fate of Constituents Released to Environment

No documentation was found which detailed the fate of the constituents released to the environment (DOE, 1992) This IHSS was studied in accordance with the IAG schedule as part of OU 1 The Final Phase III RFI/RI Report for OU 1 was issued in 1994 (DOE, 1994b) Removal of the OU No 1 radiological "hot spots" within IHSS 119 1 reduced potential risk to human health and the environment by removing known "source areas " (DOE, 1996) The June 1997 sampling demonstrates that subsurface soil at IHSS 119 1 does not serve as a point source to groundwater contamination in the vicinity of IHSS 119 1

Action/No Further Action Recommendation

The amended remedy to be taken at IHSS 119 1 will be agreed upon by the Agencies with an approved CAD/ROD amendment The amended remedy will focus on continued monitoring of groundwater at the collection well and potentially address decommissioning of the French Drain As a result, these two actions within IHSS 119 1 require further action The remainder of the IHSS is proposed as NFA

Comments

CEARP interview notes reference areas south of the 903 Pad, south of Building 952, and east of Building 881 as areas which contained construction debris, scrap metal, paper, and other miscellaneous trash The timeframe for this activity was from 1960 to 1961 This area was identified in RCRA 3004(u) as being used for solvent storage No documentation was found which supports this and retired RFP employees interviewed for the HRR (DOE, 1992) disputed that the area had ever received solvents Scrap metal was stored in drums or on the ground Areas were indicated with power poles to segregate types of scrap metal. Some of the scrap metal pieces may have been coated with solvents or other materials before being transported to the area (DOE, 1992)

IHSS 119 1 is represented on both Plate 1 and Plate 2 due to the continued monitoring of groundwater at the collection well and potential decommissioning action of the French Drain

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1994a, *Proposed Action Memorandum, Hot Spot Removal, Operable Unit No 1*, Rocky Flats Environmental Technology Site, Rocky Flats Plant, Golden, CO, September

DOE, 1994b, *Final Phase III RFI/RI Rocky Flats Plant 881 Hillside Area (Operable Unit No, 1)*, Department of Energy, Rocky Flats Plant, Golden, CO, June

DOE, 1995a, *Operable Unit No 1, 881 Hillside Area, Corrective Measures Study/Feasibility*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, February

DOE, 1995b, *Accelerated Response Action Completion Report, Hot Spot Removal,* Rocky Flats Environmental Technology Site (Operable Unit No 1), Rocky Flats Plant, Golden, CO, April.

DOE, 1996, *Annual Update for the Historical Release Report, August 1, 1995 through August 1, 1996* RF/ER-96-0046, Rocky Flats Plant, Golden, CO, September

DOE, 1997, *Corrective Action Decision/Record of Decision, Operable Unit 1 881 Hillside Area, IHSS 119 1*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO February

RMRS, 1997, *Sampling and Analysis Plan for the Implementation of the IHSS 119 1 Source Removal Project*, RF/ER-95-0120, Rocky Flats Environmental Technology Site, Golden CO, April

PAC REFERENCE NUMBER: 900-140

IHSS Reference Number	140, Buffer Zone Operable Unit
Unit Name	Hazardous Disposal Site (IAG Name Reactive Metal Destruction Site)
Approximate Location	N748,500, E2,086,000

Date(s) of Operation or Occurrence

1956 - 1970

Description of Operation or Occurrence

An area in the southeast portion of the 400-acre manufacturing area was used for the destruction and disposal of reactive metals and other chemicals Metallic lithium was destroyed on the ground in the 1950s and 1960s The activity was described in 1967 as lithium waste being disposed of in a trench, moistened, and then covered with fill at the southeast corner of the site After the reaction, the residues were buried Unknown quantities of other reactive metals (sodium, calcium, and magnesium) and some solvents were also destroyed at this location (DOE, 1992)

The area was fenced to prevent unauthorized personnel from accessing the area Signs along the fence indicated that the area was the Hazardous Disposal Site (DOE, 1992)

Physical/Chemical Description of Constituents Released

Approximately 400 to 500 pounds of lithium were destroyed and the residues, primarily lithium carbonate, buried It is believed that nine bottles of nickel carbonyl and one can of iron carbonyl were disposed of in this area in March 1969 No documentation was found which further detailed specific constituents released, including radionuclides (DOE, 1992) The Phase II RFI/RI for OU 2 stated that, in addition to lithium, other elements and compounds destroyed at this site include sodium, calcium, magnesium, solvents, and unknown liquids (DOE, 1995).

Responses to Operation or Occurrence

As part of the Phase II RFI/RI for OU 2, nine boreholes were drilled to delineate the nature and extent of contamination associated with IHSS 140 The samples were analyzed for VOCs, SVOCs, metals, pesticides, PCBs and radionuclides The analytical results were summarized in the Phase II RFI/RI Report, 903 Pad, Mound and East Trenches Area, OU 2 (DOE, 1995)

Fate of Constituents Released to Environment

Because the area affected by the releases associated with IHSS 140 was buried, the IHSS represents a potential source of subsurface contamination The results of the Phase II RFI/RI for OU 2 were used to assess the nature and extent of contamination and fate of OU 2 chemicals of concern Additionally, a Human Health Risk Assessment (HHRA) was performed which estimated the risk to human health based on the RFI/RI characterization Analytes detected above background were identified and subject to a contaminant identification screen The output from the contaminant identification screen was a list of the most prevalent chemicals of concern associated with the OU The risk posed by the chemicals of concern was estimated in the HHRA (discussed below) The concentration mean and concentration range for the OU 2 chemicals of concern as detected within IHSS 140 are presented in Table 1 along with the corresponding RFCA Tier II subsurface soil action levels (open space unless otherwise specified)

Table 1 RFCA subsurface soil action levels (DOE, 1996a) and IHSS 140 analytical results for soil (DOE, 1995) in µg/Kg

Analyte	RFCA Tier II subsurface soil action level (unless otherwise noted)	Concentration mean	Concentration range
Volatile Organics (mg/Kg)			
PCE	11 5[1]	0 041	0 002J-0 21
Metals (mg/Kg)			
Cadmium	3840	2 8	1 8 - 5 4
Radionuclides (pCi/g)			
Americium-241	38	1 45	0 01J – 12
Plutonium-239/240	252	38	0 03 – 83
Uranium-233/234	307	20 3	2 8 - 55B
Uranium-235	24	2 1	2 1
Uranium-238	103	5 3	1 8 - 15B

[1]The concentration is a RFCA Tier I subsurface soil action level, there are no Tier II subsurface soil action levels for organic compounds

The HHRA performed for OU 2 included two Areas of Concern (AOCs) AOC No 1 incorporates IHSS 140 along with the other OU 2 IHSSs Results of the HHRA indicate that Hazard Indices (HIs), which characterize non-carcinogenic effects, and cancer risk estimates are below levels of concern (i e , HI < 1 and Cancer Risk < 1 x 10^{-6}) for all of the current and possible future land use scenarios for individual pathways as well as cumulatively The scenario identified in the HHRA for OU 2 that incorporated potential exposure to subsurface soil and, as a result, the contamination associated with IHSS 140 was the "Future Construction Worker " The risk estimates are presented in Table 2

Table 2. Summary of Estimated Health Risk for AOC No 1, Future Construction Worker Exposure Scenario (DOE, 1995)

Exposure Route	Average Exposure		Reasonable Maximum Exposure	
	Carcinogenic Risk	Hazard Index	Carcinogenic Risk	Hazard Index
Ingestion of Subsurface Soil	2.5×10^{-8}	3.1×10^{-3}	1.4×10^{-7}	1.7×10^{-2}
Inhalation of Particulates	1.2×10^{-7}	1.2×10^{-10}	1.5×10^{-7}	1.5×10^{-10}
Dermal Contact with Subsurface Soils	5.6×10^{-9}	7.5×10^{-4}	3.1×10^{-8}	4.2×10^{-3}
External Irradiation from Subsurface Soils	1.2×10^{-9}	NA	1.6×10^{9}	4.2×10^{3}
Total Estimated Health Risk.	1.5×10^{-7}	3.8×10^{-3}	3.2×10^{-7}	2.2×10^{-2}

Ecological risk potentially attributable to contamination from OU 2 IHSSs was assessed in the Final Phase I RFI/RI Report Woman Creek Priority Drainage The Ecological Risk Assessment (ERA) for the Walnut Creek and Woman Creek watersheds were combined and the results presented in a single report The ERAs represent the ecological portions of the Baseline Risk Assessment associated with the RFI/RIs for OUs 1, 2, 4 (in part), 5, 6, 7, 10 (in part), and 11 (DOE, 1996b)

The ERA for the Woman Creek Priority Drainage included wide-ranging wildlife, aquatic life, aquatic-feeding birds, terrestrial-feeding raptors, small mammals, and vegetation It is concluded from results presented in DOE (1996b) that risk to ecologic receptors attributable to the residual subsurface soil contamination at IHSS 140 was negligible because subsurface soils were eliminated as a medium of concern as part of the ERA (DOE, 1996b)

Action/No Further Action Recommendation

Consistent with the RFCA Implementation Guidance (DOE, 1998), sites evaluated within an RFI/RI Report that show acceptable risk do not require additional supporting documentation to support the NFA recommendation (DOE, 1998) As documented in the Phase II RFI/RI Report for OU 2 (DOE, 1995) and summarized above, IHSS 140 was evaluated in the HHRA as AOC No 1 The results of the HHRA for the AOC and, as a result IHSS 140, show that for receptors the cumulative HIs for non-carcinogenic health effects were 0 004 or less therefore no adverse non-cancer health effects are expected under the exposure conditions evaluated The excess lifetime cancer risk for all receptors was estimated at less than 1×10^{-6}, indicating negligible risk to these receptors (DOE, 1995) Ecologic risk estimates are also acceptable (DOE, 1996b) On this basis IHSS 140 is proposed as NFA.

As indicated in Table 1, none of the OU 2 chemicals of concern were detected in IHSS 140 above the RFCA subsurface soil action levels The Tier II action level for cadmium is based on a 10-6 cancer risk or an HI of 1 for non-carcinogenic effects The radionuclide Tier II action levels correspond to an annual 15 mrem dose to a hypothetical resident As a result of this comparison, it is concluded that IHSS 140 does not pose a threat to human health or the environment Additionally, a preliminary estimate of the Risk Based Ratio Sum which is used in the CDPHE

Conservative Screen is 0 40 and includes the cadmium, PCE, and the radionuclides detected For radionuclides only, the sum is equal to 0 39

Radionuclide contamination in surface soil overlying the IHSS, if observed, is addressed by the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and the Americium Zone characterization activities which are currently underway (see PAC-112, PAC-155)

Comments

Arsenic was eliminated as a potential chemical of concern because the detection frequency within IHSS 140 was less than 5% Elimination is consistent with RFCA guidance (DOE, 1998)

IHSS 140 is within the boundary of IHSS 155 (PAC 900-155), the 903 Pad Lip Area The Sampling and Analysis Plan for the Characterization of the 903 Pad, 903 Lip Area, and Americium Zone (RMRS, 1997) is being implemented in 1998 and 1999 to further characterize and refine the volume of soils exceeding RFCA Tier I action levels within the associated IHSSs for remedial action purposes

This area, identified as the southeast corner of the site, is located near the gas storage building (Building 952), that was moved into the area in 1967 Gases destroyed as an activity near Building 952 may have been performed in this area (PAC 900-183) Aerial photographs from 1969, 1970, and 1971 show ground disturbances in the area which may reflect the reported lithium destruction activities (DOE, 1992)

IHSS 183 was proposed as NFA in 1997

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, August

DOE, 1995, *Phase II RFI/RI Report 903 Pad, Mound, and East Trenches Area Operable Unit No 2*, RF/ER-95-0079 UN, Rev 0, Rocky Flats Environmental Technology Site, Golden, CO, May

DOE, 1996a, *Final Rocky Flats Cleanup Agreement*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

DOE, 1996b, *Final Phase I RFI/RI Report Woman Creek Priority Drainage, Operable Unit 5*, RF/ER-95-012 UN, Rev 0 Rocky Flats Environmental Technology Site, Golden, CO, April

RMRS, 1997, *Sampling and Analysis Plan for the 903 Drum Storage Area (IHSS 155), Lip Area (IHSS 155) and Americium Zone*, RF/RMRS-97-084

PAC REFERENCE NUMBER: 900-155

IHSS Reference Number 155, Buffer Zone Operable Unit

Unit Name 903 Lip Area

Approximate Location N749,000, E2,086,000

Date(s) of Operation or Occurrence

1964 - 1973

Description of Operation or Occurrence

Contamination from the 903 Drum Storage Area was spread by wind and rain to adjacent soil. The contaminated area (i.e , the adjacent area around the pad and extending to the Southeast Perimeter Road) is referred to as the 903 Lip Area PAC 900-112 describes the 903 Pad activities in detail Soil southeast of the drum storage area was most strongly affected because of the prevailing wind direction and topography During the construction of the asphalt pad over the main part of the storage area, the lip area was regraded and fill dirt placed over a wide area around the pad The fill material is suspected to be contaminated as well (DOE, 1992)

Physical/Chemical Description of Constituents Released

Approximately 16 g of plutonium-239 was distributed by wind and surface water runoff in an area exceeding 2,000 acres In 1969, prior to the installation of the asphalt pad on the 903 storage area, it was estimated that 1 2 million ft^2 of soil on-Site was contaminated above 500 dpm/g (DOE, 1992)

Responses to Operation or Occurrence

Monitoring of the soil around the 903 Drum Storage Area has occurred periodically since 1958 Ground surveys for alpha detection were performed in 1964 and revealed contamination in the soil south and east of the storage area (DOE, 1992)

From 1968 through 1970, some of the radiologically contaminated material was removed, the surrounding area was re-graded and covered by an imported base coarse material and an asphalt cap However, during drum removal and cleanup activities, wind and rain spread plutonium-contaminated soils to the east and southeast from the 903 Pad area resulting in IHSS 155 (903 Lip Area) Several limited excavations have removed some of the plutonium-contaminated soils from the Lip Area, however, results from the OU 2 Phase II RFI/RI sampling and analysis confirm that radiologically contaminated soils remain (DOE, 1997)

In 1969, the area outside the storage area fence was graded and rocks and soil from this area were moved into the storage area in preparation for the asphalt pad construction In 1970, four inches of fill were placed on a 500 by 600 ft area to the east and south of the pad The area was sprayed with various chemicals to stabilize the soil. On-Site and off-Site soil surveys were performed many times to characterize the radioactive contamination from the 903 area Most or all of the re-suspended contamination was attributed to vehicular traffic on the East Perimeter Road High volume air samplers were installed east of the 124,000 ft^2 area southeast of the pad Because of the close proximity to the 903 storage area, the area had the highest levels of contamination and was stabilized with chemicals to reduce contaminant re-suspension (DOE, 1992)

In 1973, an aerial radiological survey indicated activities in the lip area that were higher than previously detected These results (approximate total of 10,500 ft^3) were confirmed by additional surveys Based on these results, it was estimated that approximately 2,000 square meters of soil would be removed to a depth of 15-cm by hand shoveling into 55-gallon drums The excavated soil was replaced with clean topsoil. This was to take place in the summer of 1975 but because of lack of funding, soil removal was deferred to 1976 Efforts were taken to stabilize and revegetate the soil In 1976, 35 4 by 4 by 7-ft crates (approximately 4,000 ft^3) of soil were removed from the highly contaminated hot spot within the lip area Removal of soil took place in a portable building equipped with a high efficiency particulate air (HEPA) filter This method was considered safe but inefficient in comparing time consumption to the amount of contaminated soil requiring removal (DOE, 1992)

Soil removal activities were conducted again from June 28, 1978 through October 13, 1978 Heavy equipment was used to move the soil. Weekly reports from the Environmental Analysis and Control group detail the soil removal activities All soil with contamination levels in excess of 2,000 cpm by FIDLER was removed to a level of 250 cpm The area covered was estimate to be 43,000 ft^2 and a depth of approximately 9 inches The soil was packaged and shipped to the Nevada Test Site (NTS) In 1978, 1,448 waste crates were removed and shipped off-Site (DOE, 1992)

Fate of Constituents Released to Environment

In 1965, contamination was greatest to the southeast and east, which suggested a gradual southeastward movement of contaminants (DOE, 1992) The Sampling and Analysis Plan for the Characterization of the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1997) is being implemented in 1998 and 1999 to further characterize and refine the volume of soils exceeding RFCA Tier I action levels Results from the characterization will aid in the assessment of remedial alternatives

Action/No Further Action Recommendation

As discussed above, the 903 Lip Area (IHSS 155) is undergoing characterization As of August 31, 1998, 14 boreholes to characterize radiological contamination have been completed in the 903 Lip Area Additionally, 80 in-situ HPGe measurements have been performed in areas adjacent to

the americium zone per the Sampling and Analysis Plan for the Characterization of the 903 Drum Storage Area (IHSS 112), 903 Lip Area (IHSS 155), and Americium Zone (RMRS, 1997)

Comments

IHSS 155 overlaps IHSS 140

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1997, *Annual Update for the Historical Release Report*, RF/RMRS-97-073 UN Rocky Flats Environmental Technology Site, Golden, CO, September

RMRS, 1997, *Sampling and Analysis Plan for the 903 Drum Storage Area (IHSS 155), Lip Area (IHSS 155) and Americium Zone*, RF/RMRS-97-084

SECTION 4.0

OTHER SIGNIFICANT EVENTS (TO DATE)

PAC REFERENCE NUMBER: Not applicable

IHSS Reference Number	Not Applicable, Buffer Zone Operable Unit
Unit Name	RFCA-reportable Values in Walnut Creek
Approximate Location	N754,000, E2,094,000

Date(s) of Operation or Occurrence

June 12, 1997

Description of Operation or Occurrence

In August 1997, surface water sampling revealed RFCA-reportable values for plutonium-239/240 and americium-241 at the GS03 monitoring location near the Walnut Creek and Indiana Street Flume Pond (IHSS 142 12) (DOE, 1998A) The GS03 monitoring location is a Point of Compliance (POC) pursuant to RFCA which stipulates that such reportable occurrences require reporting, a source evaluation, and mitigating action where appropriate It was also observed that RFCA-reportable values existed at two other up-gradient monitoring locations which are considered Points of Evaluation (POEs) (DOE, 1998a) The occurrences are summarized as follows (RMRS, 1997a, RMRS, 1997b, RMRS, 1997c)·

- RFCA-reportable 30-day moving average values were measured at the POC monitoring location at Walnut Creek and Indiana Street (referred to as GS03) for the period June 12 through July 2, 1997 (see Figure 4-1(a) and Table1),

- RFCA-reportable 30-day moving average values were also measured at the POE monitoring location above Pond B-1 (referred to as GS10) for the periods April 13 through April 24, 1997, May 25 through June 20, 1997, August 2 through October 21, 1997 (DOE, 1998b), and

- RFCA-reportable values were observed at the POE monitoring location above Pond A-1 (referred to as SW093) for the period August 2, 1997 through August 3, 1997

Figure 4-1(a). POC Gaging Station GS03 30-Day Moving Averages

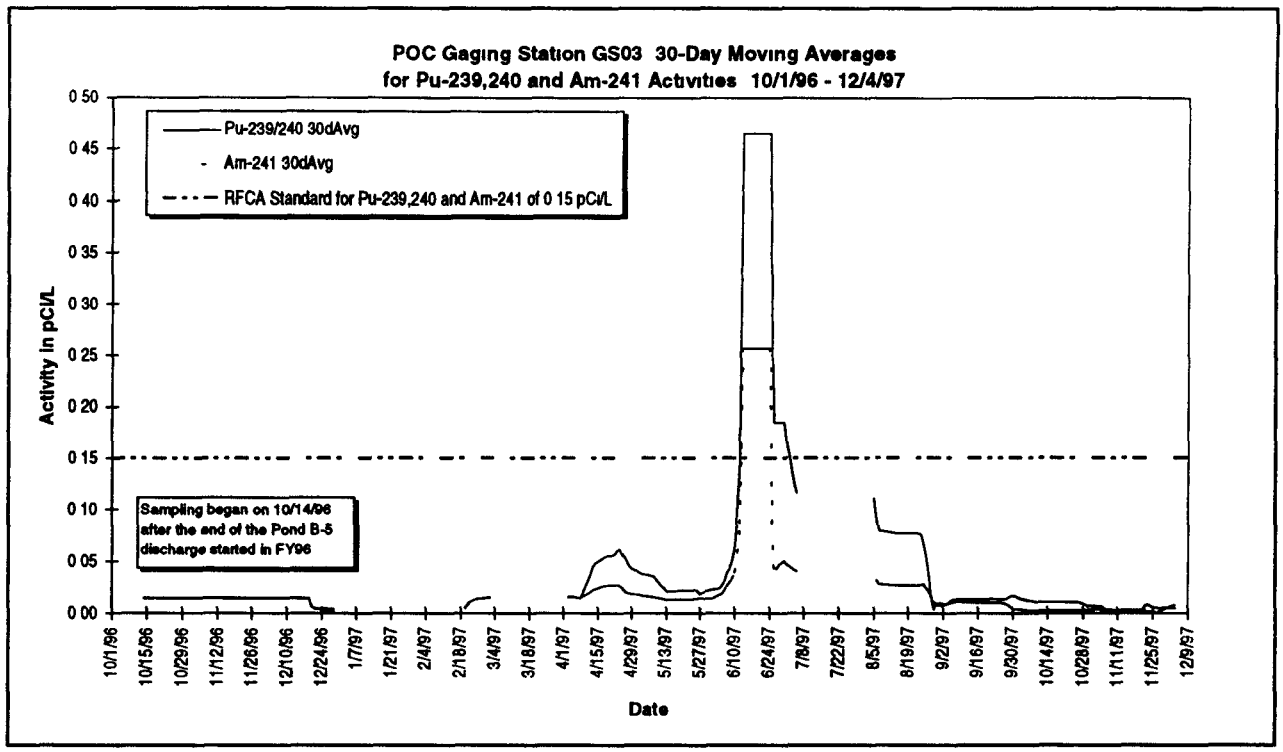


Table 1. Water-Quality Information from GS03 October 1, 1996 through December 4, 1997

Location	Parameter	Date(s) 30-Day Average Above 0 15 pCi/L	Date(s) of Maximum 30-Day Average	Maximum 30-Day Average (pCi/L)	Volume Weighted Average for Period (pCi/L)
GS03	Pu-239,240	6/12/97 - 7/2/97	6/13/97 - 6/24/97	0 465	0 024
GS03	Am-241	6/13/97 - 6/24/97	6/13/97 - 6/24/97	0 256	0 014

Physical/Chemical Description of Constituents Released to Environment

The Final Report to the Source Evaluation and Mitigating Action Plan for Walnut Creek (DOE, 1998a) documents the 30-day average of plutonium-239/240 and americium-241 at the POC GS03 and at two POE which were observed during the reporting period for this document

Response to Occurrence

Site personnel are conducting a surface-water source investigation using state-of-the-art research methods and technologies Enhancements in monitoring activities and administrative processes have been implemented to provide early indications and improved resolution of any future water-quality excursions, and to continue to investigate the cause of elevated plutonium-239/240 and americium-241 levels at GS03 and related upstream locations

An extensive evaluation of historical data has been completed and additional soil, sediment, and water samples have been collected, and assessed (DOE, 1998a)

Fate of Constituents Released to the Environment

To date, no localized areas of radiological contamination have been identified, either historical or resulting from current operations that could have caused this reportable occurrence Site personnel believe that the likely source for the occurrence of the 30-day average for plutonium-239/240 and americium-241at POC GS03, was diffuse radionuclide contamination from past Site operations released to the environment through events and conditions over past years Sensitivity analyses on the available monitoring data also indicate that the GS03 occurrence was strongly influenced by a single, elevated sample result that was collected during unseasonably low-flow conditions The source evaluation has uncovered no information to indicate that recent Site activities are responsible Because the diffuse sources of plutonium and americium appear to be wide-spread and the plutonium and americium standards of 0 15 pCi/L are low, it is probable that there will be future reportable occurrences (DOE, 1998a)

Action/No Further Action Recommendation

The Final Report to the Source Evaluation and Mitigating Actions Plan for Walnut Creek (DOE, 1998a) contains no specific recommendations for source control for the reportable occurrence that was measured at GS03, and further, the source investigations have identified no localized source(s) of contamination. The recommended course of action that would not compromise protection of human health and the environment is based upon the following

- the plutonium and americium released from the Site which caused the reportable occurrence, aggregated with the volume-weighted activity for the Water Year, is well below the annualized mass loading used to develop the POC Standard value of 0 15 pCi/L plutonium and americium, and

- there is no consumptive use of the RFETS water that is discharged due to the recent purchase of a new water supply and construction of a new water treatment facility in Broomfield, Colorado The recommended course of action does not impair or impede Site implementation of mitigation activities should new sources be identified or if additional occurrences warrant corrective actions

Recommended Course of Action

- Continue observation (routine monitoring and special sampling, as appropriate to the evaluation) and ongoing data interpretation to provide understanding of actinide transport directly related to the operation of the Site automated surface water monitoring network,

- Continue progress on the Actinide Migration Studies (AMS) as a multi-year technical study to provide understanding of plutonium, americium, and uranium migration to eventually provide

insights about the cause(s) and possible prevention of radionuclide transport and associated water-quality reportable occurrences (RMRS, 1998),

- Continue use of the existing detention ponds to clarify storm-water of potentially contaminated sediment and particulate matter as an effective best management practice,

- Incorporate direct and increased stakeholder participation through the formation of a Surface-Water Issues Working Group as outlined in Appendix 5 of RFCA, and,

- Provide progress reporting through AMS reports, Quarterly RFCA Reports, Quarterly State Exchange Meetings, and informal status/flash briefs

Comments

Several questions continue to be evaluated or are awaiting closure relative to understanding water-quality issues in the Walnut Creek basin

- Can source control effectively control water quality and prevent future occurrences?
- Are small, isolated contaminant particles a factor in, or the cause of such occurrences?
- Are detection limits and low-activity analytical measurements a factor?
- Are changed sampling techniques and practices a factor in the incidents?
- Will pending Walnut Creek basin soil testing and watershed modeling reveal some previously unrecognized problem areas in the basin?

A proposal to construct a pipeline (referred to as the Mckay Bypass Extension) will convey water from Coal Creek to Great Western Reservoir without commingling with RFETS discharge waters This project is currently in planning stages The Great Western Reservoir water supply is used exclusively for irrigation and recreational use

References

DOE, 1998a, *Final Report to the Source Evaluation and Mitigating Actions Plan for Walnut Creek,* Rocky Flats Environmental Technology Site, Golden CO, April

DOE, 1998b, Correspondence to S Gunderson, CDPHE and T Rehder, EPA Region VIII, from R Sarter, DOE, Re Notification of RFCA-reportable values at POE monitoring location GS10, September 23

RMRS, 1997a, *Progress Report #1 to the Source Evaluation and Preliminary Mitigation Plan for Walnut Creek, Rev 0,* RF/RMRS-97-089 UN, Rocky Flats Environmental Technology Site, Golden, CO , September

RMRS, 1997b, *Progress Report #2 to the Source Evaluation and Preliminary Mitigation Plan for Walnut Creek, Rev 0*, RF/RMRS-97-115 UN, Rocky Flats Environmental Technology Site, Golden, CO November

RMRS, 1997c, *Progress Report #3 to the Source Evaluation and Preliminary Mitigation Plan for Walnut Creek, Rev 2*, RF/RMRS-97-131 UN, Rocky Flats Environmental Technology Site, Golden, CO , December

RMRS, 1998, *Sampling and Analysis Plan for Investigation of Surface Soil Actinide Content in the Walnut Creek and Woman Creek Watersheds at the Rocky Flats Environmental Technology Site*, Rocky Flats Environmental Technology Site, Golden, CO February

PAC REFERENCE NUMBER: 900-1318

IHSS Reference Number	Not Applicable
Unit Name	Release of F001 Listed Waste Water to Soil
Occurrence Report #	RFO-KHLL-ENVOPS-1996-0011
Approximate Location	N749,995, E2,086,231

Date(s) of Operation or Occurrence

October 7, 1996

Description of Operation or Occurrence

On October 7, 1996 at approximately 10 00 a m , workers discovered a small amount of waste water leaking from a level-indicating valve associated with the SW-59 collection tank The valve was positioned on the north side of the tank and the estimated volume of water (which contains F001 listed RCRA constituents) reaching the soil was about one pint The fitting was tightened immediately which stopped the leak and the area was monitored for Volatile Organic Compounds (VOCs) during cleanup of the soil

Physical/Chemical Description of Constituents Released

Contaminants identified in the SW-59 Collection Seep are as follows

Compound
Carbon Tetrachloride
Chloroform
Tetrachloroethene
Trichloroethene

Response to Operation or Occurrence

Upon discovery of the waste water leaking from the level-indicating valve, workers tightened a fitting which immediately stopped the leak The spill area was contained after the area was monitored for VOCs The affected soil and rock were containerized Approximately one 55 gallon drum of soil was removed and transported to a RCRA Hazardous Waste Management Unit after radiological screening was performed Cleanup verification samples were collected to verify that the site was remediated and the RCRA Contingency Plan Implementation Report (CPIR) was filed

Fate of Constituents Released to the Environment

One 55 gallon drum of soil and rock potentially contaminated with EPA Waste Code F001 was removed and transported to a RCRA Hazardous Waste Management Unit No radiological contamination was found in the area of the release Analytical data later confirmed that the contaminated soil had been removed

Action/No Further Action Recommendation

This PAC does not warrant further investigation due to the small amount of material released to the environment, the immediate cleanup response, and the cleanup verification samples showing that the release was adequately remediated

Comments

This PAC was inadvertently numbered as 900-1307 in the 1997 Annual Update and proposed as NFA (DOE, 1997) The PAC Reference Number has been corrected as PAC 900-1318

The minimal release was directly attributable to a 24 hour tank and pipe inspection conducted at the facility The incident did not result in any injury or potential hazard to human health or the environment

References

DOE, 1996, *Occurrence Report (RFO-KHLL-ENVOPS-1996-0011),* Rocky Flats Environmental Technology Site, Golden, CO, October

DOE, 1997, *Annual Update for the Historical Release Report,* RF/RMRS-97-073 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

RMRS, 1997, *Consolidated Water Treatment Facility Quarterly Operating Report, Fourth Quarter,* Rocky Flats Environmental Technology Site, Golden, CO, January

RMRS, 1997, *Environmental Operations CERCLA History Files,* Rocky Flats Environmental Technology Site, Golden, CO, July

PAC REFERENCE NUMBER: Not applicable

IHSS Reference Number — Not Applicable, Buffer Zone Operable Unit

Unit Name — RFCA-reportable Values in the South Interceptor Ditch

Approximate Location — N747,000, E2,088,000

Date(s) of Operation or Occurrence

May 25, 1998

Description of Operation or Occurrence

In May 1998, surface water quality monitoring revealed RFCA-reportable values of plutonium-239/240 were elevated at the SW027 monitoring location near the inlet to Pond C-2 in the Woman Creek drainage (within the South Interceptor Ditch [SID]) (DOE, 1998a)

As specified in the Integrated Monitoring Plan (IMP), Site personnel evaluate 30-day moving averages for selected radionuclides at RFCA POEs and POCs Water-quality measurements at POE surface-water monitoring location SW027 in May 1998 show RFCA-reportable values for plutonium-239/240 SW027 is located on the SID above (upstream of) the inlet to Pond C-2 Results for 30-day moving averages at SW027 for this time period are summarized below in Table 1 and plotted on Figure 4-2

Table 1, Water-Quality Information from SW027 for the Period 10/1/96-5/25/98

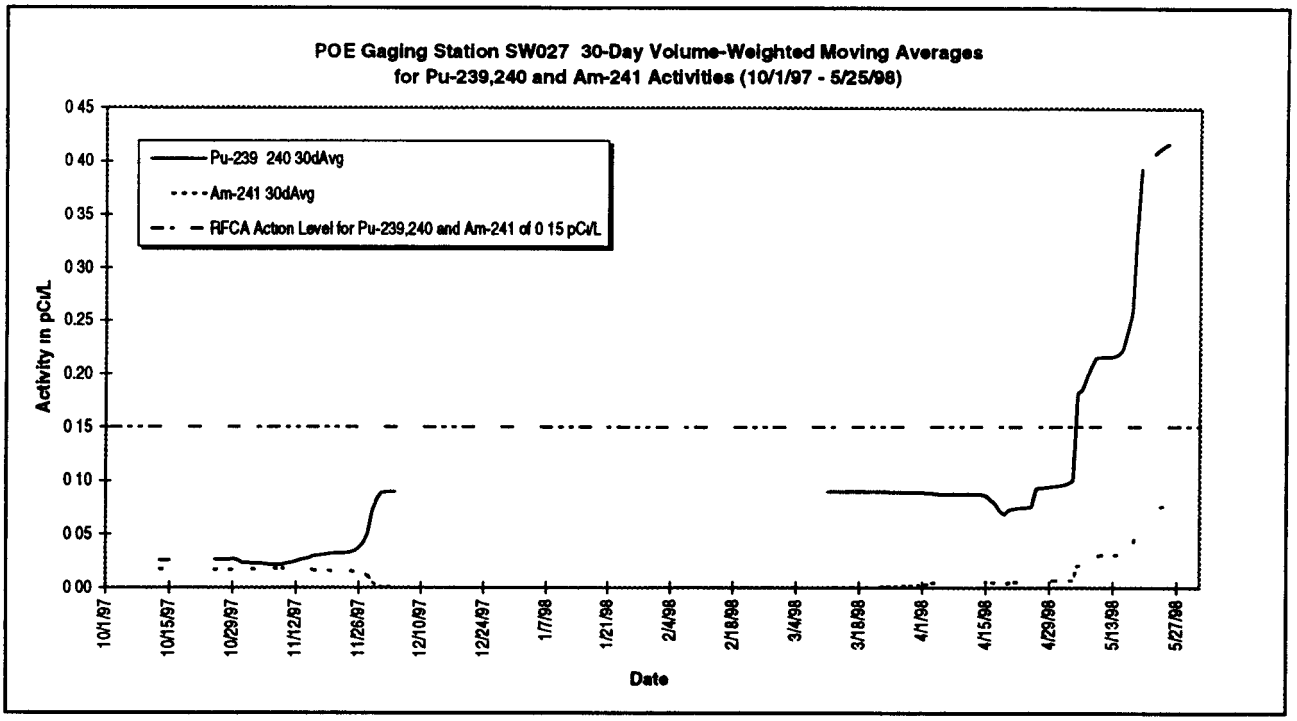
Location	Parameter	Date(s) 30-Day Average Required Reporting	Date(s) of Maximum 30-Day Average	Maximum 30-Day Average (pCi/L)	Volume Weighted Average for Water Year 1998 to Date (pCi/L)
SW027	Pu-239,240	5/5/98 - 5/25/98[a]	5/25/98	0 42	0 15

[a] As of 5/25/98, values at SW027 required reporting under the RFCA Action Level Framework.
[b] Data from 5/25/98 through 9/25/98 have not been returned from the laboratories

Physical/Chemical Description of Constituents Released to Environment

The laboratory narrative for the individual analytical results for the composite samples collected around the period of these reported 30-day averages has been reviewed and there is no reason to question the accuracy of these results A review of historical monitoring data shows that these results are not unusual Storm-event and grab samples collected at SW027 from 1990 through 1996 (under pre-RFCA protocols) had an arithmetic average plutonium-239/240 activity of 0 25 pCi/L with a maximum of 2 29 pCi/L The apparent trend upward during Water Year (WY) 98 is likely due to seasonally increasing flow rates and precipitation intensity which result in increased transport of suspended material. Individual composite sample results and details are shown in Table 2 for the period of interest

Figure 4-2. Gaging Station SW027 30-Day Averages WY98 to Date



Note Gaps in the 30-day average above are for periods of zero flow at SW027

Table 2. Selected Composite Sample Analytical Results for SW027

Composite Sample Period	Plutonium-239,240 (pCi/L)		Americium-241 (pCi/L)		Composite Sample Volume (Liters)	SID Discharge Volume During Sample Period (Million Gallons)
	Result	Error	Result	Error		
4/13 - 4/20/98	0 040	0 031	-0 004	0 026	19 2	2 72
4/20 - 4/30/98	0 204	0 065	0 016	0 030	19 4	1 3
4/30 - 5/8/98	0 802	0 156	0 124	0 051	9 4	0 73
5/8 - 5/26/98	0 333	0 115	0 106	0 073	10 6	0 86

Note All composite samples listed above were of adequate volume for all required analyses

Response to Occurrence

The surface water flows sampled at SW027 were subsequently detained in Pond C-2 This water was then batched and discharged from Pond C-2 during the period 5/21/98 through 5/30/98 Results from the pre-discharge sample collected on 5/5/98 from Pond C-2 were 0 031 ±0 006 pCi/L plutonium Analytical results for the composite samples collected at POC gaging station GS31 during the C-2 batch discharge were within typical activity levels for that location During this time period, no off-normal conditions were noted in decontamination and decommissioning (D&D), special nuclear material (SNM) stabilization, or environmental cleanup activities that may

have affected water quality, nor were there any closure activities occurring in the SID drainage tributary to SW027 However, this drainage does contain areas of above-background surface-soil contamination, including the 903 Pad and Lip Area

The Source Evaluation Plan for RFCA POE SW027 (RMRS, 1998) describes the proposed source evaluation activities Source evaluations will be performed to determine the location, extent, and significance of areas that may have an adverse impact on surface-water quality Source evaluations may include analysis of constituent transport and loading, as well as the evaluation of water-quality correlation's that may indicate the location of a contaminant source A Source Evaluation Report will be produced based on an evaluation of existing data and results from the following actions (DOE, 1998b)

- Flow-paced sampling at SW027 and GS31, will continue as specified by the IMP
- A walk-down of the SW027 drainage area will be used in an effort to visually identify conditions that may indicate source areas
- Existing environmental information will be evaluated for trends and correlation which may indicate the locations of source areas Fate, transport, and loading analyses will be performed where data is of sufficient quality and quantity
- A complete data set will be presented of automated data collected under the Event-Related Surface-Water, Industrial Area IM/IRA, and RFCA/IMP Monitoring Programs at tributary gaging stations SW027, GS21, GS22, GS23, GS24, GS25, and GS42
- Existing data from Site surface-water characterization reports (e.g , Surface Water and Sediment Geochemical Characterization Reports) and monitoring reports (e g , Event-Related Surface Water Monitoring Reports) will be compiled and evaluated
- Data will be reviewed from the Industrial Area OU gamma spectroscopy survey, conducted in 1993 and 1994, that utilized HPGe detectors
- Site closure activities being conducted upstream from SW027 at the time of, or just prior to, the period of interest will be investigated Activities that could potentially impact surface water, including building D&D, SNM stabilization, environmental remediation projects, excavation work, and routine day-to-day operations will be reviewed
- Analysis of historical reports and data will provide the basis for the sediment and soils investigation Existing reports on sediment and soils investigations will be compiled and reviewed for information that will aid the SW027 source investigation
- The HRR and its annual updates provide a listing of all known spills, releases, and incidents involving hazardous substances occurring since the Rocky Flats Plant began operations in the

early 1950s Based on information in this document, a summary of historical releases to the SW027 drainage and changes to this drainage will be compiled and assessed

- Subsurface water-quality data for groundwater wells in the vicinity of SW027 will be compiled and considered in relation to surface-water quality trends

- The Site is currently involved in comprehensive multi-year AMS to improve understanding of the behavior and transport of actinides in the environment AMS will provide information about the nature of potential sources and the mobility of actinides in the Site environment The major goals of AMS are to

    - Assess the long-term protectiveness of the actinide soil action levels on surface water,
    - Design remedial actions that minimize actinide migration after Site closure and are protective of surface water quality, and
    - Understand the actinide environmental transport mechanisms by refining the Conceptual Model.

Fate of Constituents Released to the Environment

The initial source evaluation effort is in progress To date, no localized areas of radiological contamination have been specifically identified

Action/No Further Action Recommendation

The Site intends to deliver a Source Evaluation Report for POE SW027 by October 29, 1998 Should source evaluations be successful and indicate that control actions would be appropriate and also effective at significantly improving water quality, the Site will evaluate control options on a sitewide basis in conjunction with the Site's ER prioritization process Appropriate source-control measures will be targeted and designed based on the results of the source evaluation If source evaluations are inconclusive, and additional reportable values are measured at SW027, then additional evaluation may be considered and a supplement to the report would be produced (DOE, 1998b)

Comments

None

References

DOE, 1998a, Correspondence to S Gunderson, CDPHE and T Rehder, EPA Region VIII, from R Sarter, DOE, Re Notification of RFCA-reportable values at POE monitoring location SW-027, July 23

DOE, 1998b, *Source Evaluation Plan for RFCA Point of Evaluation SW027*, Revision 3, RF/RMRS-98-259 UN, Rocky Flats Environmental Technology Site, Golden, CO , August

RMRS, 1998, *Sampling and Analysis Plan for Investigation of Surface Soil Actinide Content in the Walnut Creek and Woman Creek Watersheds at the Rocky Flats Environmental Technology Site*, Rocky Flats Environmental Technology Site, Golden, CO , February

PAC REFERENCE NUMBER: Not applicable

IHSS Reference Number	Not Applicable, Buffer Zone Operable Unit
Unit Name	Modular Storage Tanks Slope Failure
Approximate Location (Mound Area)	N751,938, E2,084,394

Date(s) of Operation or Occurrence

Description of Operation or Occurrence

There are three Modular Storage Tanks (MSTs) located in the Buffer Zone on the north side of the Perimeter Road due north of Building 774 Each tank is approximately 112 ft in diameter with 10 ft high sidewalls, has a capacity of 500,000-gallons and is constructed of galvanized steel with a high density polyethylene (HDPE) liner The tanks were constructed on an earth pad partially in a cut section (west portion) and partially on a fill area (east portion) against the hillside along North Walnut Creek. The MSTs are used to store water which is collected by the Interceptor Trench System (ITS) The ITS was built in 1981 to capture surface water and groundwater contaminated with nitrates and uranium from the Solar Evaporation Ponds and prevent it from flowing into North Walnut Creek. Water is pumped via piping from the ITS pump house to the tanks and then from the tanks to Building 374 for evaporation, or to the D-231 A/B tanks for storage prior to evaporation

In October 1996, several structural cracks were found on the southeast hillside of the MST site Monuments installed during construction of the tanks to monitor for potential movement indicated that the southeast fill slope was experiencing movement The original design engineering consultant was subsequently contracted to perform a geotechnical evaluation in early 1997 Upon completion of the evaluation, the engineering consultant recommended that stabilization of the hillside be performed so that movement did not reach unacceptable levels Subsequent surveying has indicated significant movement of the hillside area due to spring moisture, which is expected to cause additional significant movements On April 13, 1998, the slope failure at the MST site damaged the effluent transfer line between pump-houses 308A and 308B The damaged transfer line resulted in a release to the environment of approximately 100 gallons of MST-stored water

Physical/Chemical Description of Constituents Released to Environment

According to the Unit Information Sheet (UIS) posted on the MSTs, it is possible for the MST water to have low levels of hazardous constituents, specifically carbon tetrachloride and TCE The UIS sheet attaches EPA Waste Codes F001, F002, F003, F005, F006, F007, F009 and F039 based upon historical use of the Solar Evaporation Ponds (SEPs) Constituents associated with these codes may have been present in the SEP liquids and sludge, but none have been detected in

the ITS water Recent analyses of the ITS water show elevated levels of nitrate (260 mg/L) and uranium (70 pCi/L) According to RFCA, any contamination in surface water resulting from releases from a unit subject to RCRA interim status requirements will be assessed against Attachment 5, (Action Levels and Standards Framework or "ALF") Table 1 ALF requires monitoring of surface water at POCs for analytes of interest set forth in the IMP, a RFCA-required document Water released from the transfer line eventually flowed through Pond A-3, which is monitored for nitrates and, further downstream, through the POC at Walnut Creek and Indiana St , where uranium is an analyte of interest

Response to Occurrence

In April, 1998, emergency repairs were performed which included the installation of temporary above ground influent and effluent lines between the pump-houses to restore system operability Additionally, sump drain lines that were discharging into the slide area were extended to discharge below the slide in an effort to reduce slope movement These repairs were performed as a temporary mitigation action to allow the required operations of the MST system to continue while the appropriate long-term corrective actions are developed and implemented In addition, the following protective measures were employed (RMRS, 1998)

1 The access road area at the southeast corner of the tank pad was closed off to vehicle traffic and the movement area was roped off to prevent personnel from unnecessarily entering the increasingly unstable area

2 Weekly to bi-weekly survey measurements and site inspection by plant engineering were initiated to evaluate the condition of the site

3 A geotechnical review of the slope has been undertaken to provide an expeditious technical opinion of the stability of the MSTs

4 Emergency repairs were performed which included

- Temporary above ground influent and effluent lines were installed between pump-houses 308A and 308B
- Temporary modifications were performed on the wellhead sump in the center of the MST pad on the north side, which collects groundwater and routes it away from the pad
- Under-drain piping, which collects water along the north side of the pad and discharges water to the northwest of pump-house 308B and into the slough area, was extended south beyond the landslide area with temporary above ground piping
- Cracks in the asphalt around Tank C were sealed with hot placed asphalt crack sealant to prevent water from entering the cracks and further exacerbating the instability of the pad

- Tank C was removed from service by lock out/tag out pending completion of the geotechnical evaluation

- A branch was installed in the above ground influent piping to the tanks to enable water to be discharged into the A-1 pond via an above ground line

- State and Federal regulators and local communities were notified of the Site's modification to ITS water management to use Pond A1 for storage if required

Fate of Constituents Released to the Environment

Monitoring results at the locations described above, subsequent to the release, showed no increased levels of nitrate or uranium

Action/No Further Action Recommendation

Two corrective actions have been recommended to address the short-term and long-term needs of the MST system To stabilize the MST hillside and reduce the risk of additional system failures, the first recommendation involves laying back the embankment at a 3 to 1 slope beginning approximately 10 ft from the easternmost tank (Tank C), and terminating the lay back with a rock toe buttress. To provide freeze protection for the transfer lines that were installed as part of the April 1998 emergency repairs, the second recommendation involves burying the transfer lines

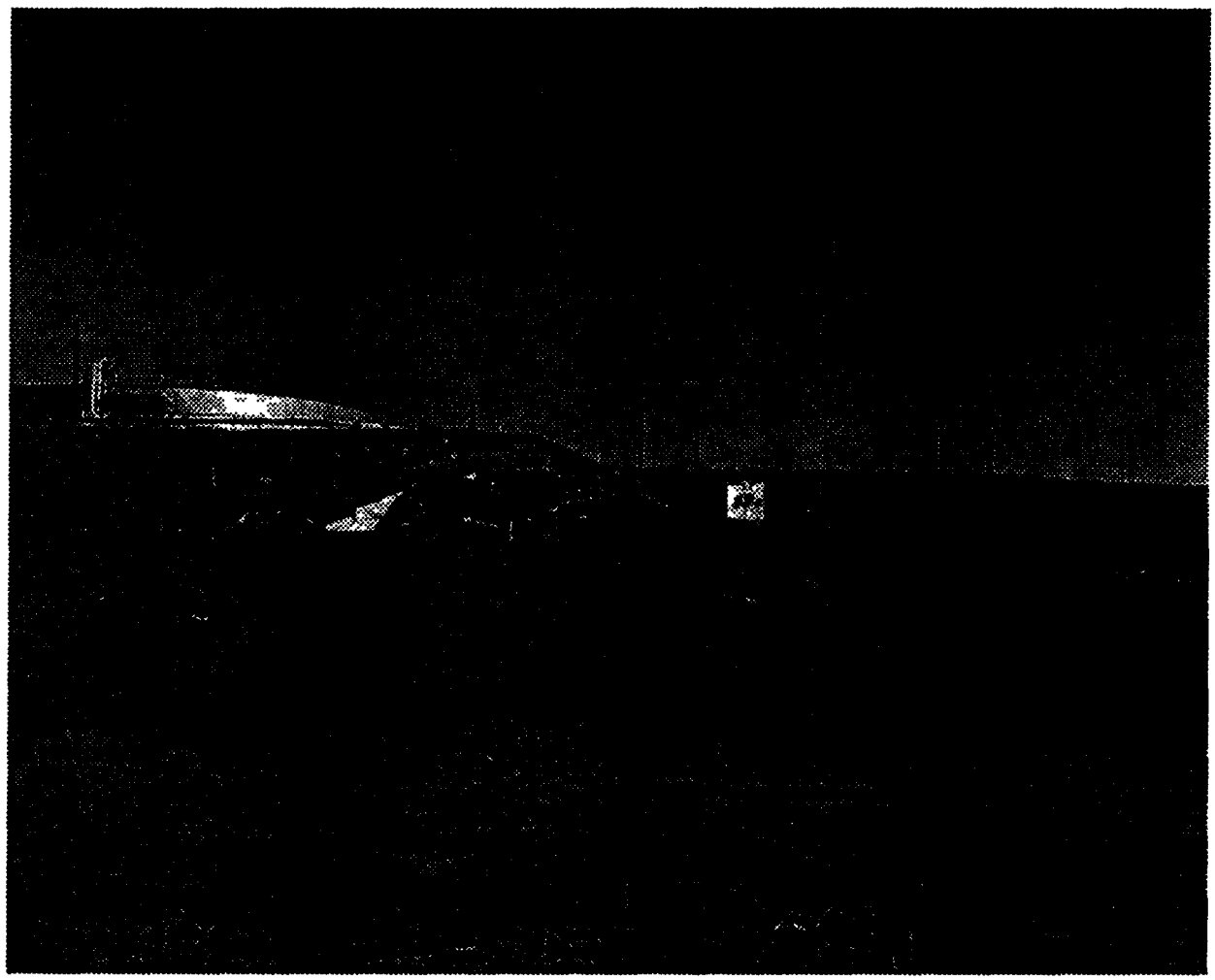
Comments

None

References

RMRS, 1998, *Response Plan for the Hillside Failure at the Temporary Modular Storage Tank Site, Part 1 and 2, (RF/RMRS-98-251 UN, Rev 0)*, Rocky Flats Environmental Technology Site, Golden, CO June

Photo 1. MST Slope Failure



PAC REFERENCE NUMBER: Not applicable

IHSS Reference Number	Not Applicable, Buffer Zone Operable Unit
Unit Name	Mound Site Plume
Approximate Location	N750,108, E2,086,109

Date(s) of Operation or Occurrence

August 1954 - September 1958, Present

Description of Operation or Occurrence

In April 1954, the mounding of contaminated combustible wastes from Building 444 was suggested as a method of disposal The Mound was developed by scraping a shallow trench, aligning drums in rows, and covering them with soil with the resulting burial site extending above initial ground level. RFP photographs from April 21, 1954, show the mounding of the first 869 drums of contaminated wastes from Building 444 The drums had been shipped to the Mound area between April 12, 1954, and April 21, 1954 Several drums had pinhole leaks at the time of burial (DOE, 1992)

Mounding activities continued until September 1958 Drums from Building 444, Building 869, Building 883, Building 771, and Building 776 were placed in the Mound Different sides of the Mound were opened periodically for disposition of drums. After September 1958, additional drums were moved to the Mound area but not placed in the mound In July 1959, they were moved to the 903 Pad area The burning of uranium-contaminated oil became an acceptable method of disposal in 1959 and mounding was discontinued (DOE, 1992)

On February 9, 1959, one drum of liquid waste from Building 776 was punctured at the Mound Two trucks were contaminated to a level greater than 100,000 cpm and were cleaned at Building 774 One service department employee's shoes were contaminated as well and cleaned at Building 776 One drum of liquid waste from Building 881 leaked at the Mound in April 1960 (DOE, 1992)

During the construction of the Perimeter Security Zone in 1981, several areas of uranium-contaminated soil were detected in the Mound area and removed (DOE, 1992)

The Mound Site Plume is a small plume located on the east side of the RFETS Industrial Area, and east of the PA fence This plume is believed to originate from the Mound Site, and extends northward The plume discharges at less than 2 gallons per minute as seeps and subsurface flow into the South Walnut Creek drainage

Physical/Chemical Description of Constituents Released

Contamination resulted from organic liquid wastes Radioactive elements of the waste were in the forms of depleted uranium and enriched uranium, with some limited plutonium As a result of the punctured drum in February 1959, an unknown amount of soil in the Mound area was contaminated to a level greater than 100,000 cpm (DOE, 1992)

The ground and pallets had levels of contamination greater than 100,000 cpm due to the liquid waste from Building 881 that leaked in April 1960 The area was roped off pending cleaning No documentation was found detailing the results of the cleaning effort (DOE, 1992)

Odors of solvents were detected by construction workers when they encountered groundwater in the Mound area during construction of the PSZ (DOE, 1992)

Contaminants in the Mound Site Plume are primarily VOCs, but radionuclides and naturally occurring metals below background levels have been detected as well The VOCs and some radionuclides are in excess of RFCA action levels

Responses to Operation or Occurrence

On August 26, 1954, soil samples were taken from a barrel burial site located southeast of Building 991 Soil contaminated as a result of the punctured drum in February 1959 was removed to a level of 1,000 cpm. This contaminated soil was associated with the Mound and not Trench No 1 because the trench was not activated until November 1954 (DOE, 1992)

On April 14, 1970, excavation of the Mound began. All drums were removed by the end of May 1970 Approximately 10 percent of the drums were thought to have holes No detectable alpha contamination was found in the soil at the time of removal. Solid material was shipped off-Site for burial Drums with liquids were sent to Building 774 for processing Those that were leaking at the time of excavation were pumped into sound drums before processing in Building 774 Empty drums were boxed with absorbent material and shipped for off-Site burial No personnel or equipment contamination resulted from the excavation of the mound and no airborne contamination was detected Soil from the excavation was graded and excess was placed in the Present Landfill Four wells were drilled in the four corners of the Mound area for groundwater monitoring (DOE, 1992)

A source removal action was initiated on March 21, 1997 and completed on April 8, 1997 Soil from the Mound Site (IHSS 113) was temporarily staged and managed in an area designed for this purpose until treatment could begin. Treatment began on August 5, 1997, utilizing Low Temperature Thermal Desorption and was completed by August 22, 1997 Treated soil was placed back into the Mound excavation by September 8, 1997 This action was authorized by the Agency approved PAM for the Source Removal at the Mound Site, IHSS 113 in February 1997 (DOE, 1997)

In fiscal year 1998, the RFETS installed a passive groundwater treatment system to remediate the Mound Site Plume, the seventh ranked item on the Site's Environmental Remediation priority list The reactive iron system removes the chlorinated organic compounds and radionuclides present in the groundwater at this location which are in excess of action levels defined in the RFCA. The technology demonstrated at this site will confirm performance of the technology for potential application on other RFETS plumes

Construction of the collection and treatment system was completed in fiscal year 1998 The collection and treatment system consists of a groundwater capture system that intercepts the contaminated groundwater upgradient of South Walnut Creek and directs it through a reactive iron treatment system Conventional excavation techniques were used to install the collection system, which is composed of a subsurface impermeable plastic membrane barrier and a collection line immediately upgradient of the barrier Porous filter pack was placed from the top of the confining layer to a level above the horizontal collection line to facilitate groundwater flow to the collection line The trench was then backfilled and excess fill was spread over the top of the collection system

The collected groundwater flows by gravity from the collection line into a reactive iron treatment system where it is treated to the appropriate surface water action levels The groundwater passes through reactive iron, which was placed in a tank designed for uniform flow distribution As the water passes through the bed the reactive iron catalytically removes chlorine from the VOCs The end-products of this chemical reaction are dehalogenated hydrocarbons, such as ethene and ethane, and non-toxic salts. Radionuclides are removed by chemical reduction and/or absorption and remain on the reactive material The treated groundwater meets RFCA action levels and is discharged to South Walnut Creek through an infiltration gallery, or directly

The downgradient capture system was chosen as the best remediation method following an evaluation of other more traditional options, such as pump and treatment in above ground systems The reactive iron treatment system was selected as maintenance and monitoring costs are reduced and RFETS skyline impacts are minimized Application of this developing technology is consistent with the RFETS closure philosophy of using state-of-the-art technologies to minimize Site costs and thereby expedite closure

Fate of Constituents Released to Environment

At the time of initial mounding of drums, it was believed that any water leaching the material contained in the drums would have drained into the gully north of the Mound because of the natural topographic slope The gully also received sewage treatment plant effluent Any activity not removed by the soil in the Mound and then carried by water to the gully would have been diluted by the effluent and the retention ponds These retention ponds have been monitored since the beginning of plant operations Migrating contaminants would have been detected prior to their off-Site release These retention ponds are detailed in PAC NE-142 5 - NE-142 9 (DOE, 1992) Groundwater monitoring reports indicate that groundwater in the vicinity of the Mound

Area is contaminated with inorganics, radionuclides, and volatile organic compounds This IHSS was studied as part of OU 2, 903 Pad, Mound and East Trenches

Action/No Further Action Recommendation

RFETS installed a passive groundwater treatment system to remediate the Mound Site Plume in Fiscal Year 1998 and initiated operation in September 1998 Funding for this project was provided by the DOE Office of Science and Technology Subsurface Contaminant Focus Area as a technology demonstration for further application at RFETS and other DOE sites Environmental Protection Agency's Superfund Innovative Technology Evaluation (SITE) Program will monitor the operation of the Mound Site Plume Treatment System The data gathered from the monitoring program will subsequently support the design of treatment systems for other RFETS plumes Technology application at other DOE sites with similar contamination in their groundwater is also possible

Comments

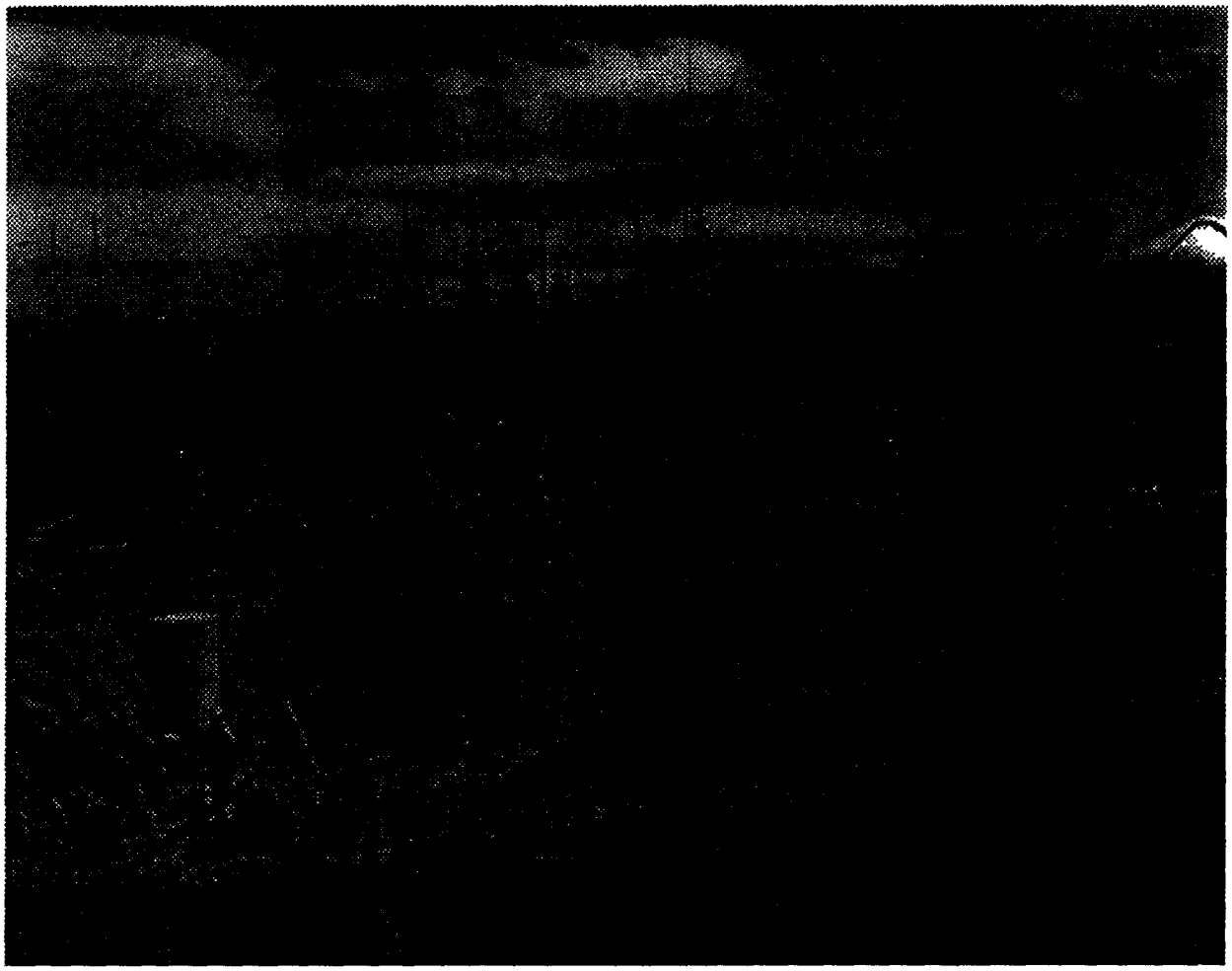
Many references document that the Mound was no longer used for the burial of waste materials after 1959, however, several documents indicate activities at the Mound at later dates A request was made and approval was given in December 1962 for the burial of 14 drums of depleted uranium waste in the Mound burial area No documentation was found stating that the burial occurred, yet, documents indicate that Trench T-1 (PAC 900-108), located adjacent to the mound, accepted these drums Therefore it is assumed that activities occurring at the Mound after September 1958 related to storage activities and not burial (DOE, 1992)

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

DOE, 1997, *Proposed Action Memorandum for the Source Removal at the Mound Site IHSS 113, Revision 0,* RF/RMRS-96-0059, Rocky Flats Plant, Golden, CO, February

Photo 2. Mound Site Plume Treatment Project



PAC REFERENCE NUMBER: UBC 123

IHSS Reference Number	UBC 123, IHSS 121, IHSS 148 Industrial Area Operable Unit
Unit Name	Building 123 Under Building Contamination
Approximate Location	N749,000, E2,082,000 (Building 123)

Date(s) of Operation or Occurrence

1953 – 1997

Description of Operation or Occurrence

Persons interviewed for the CEARP Phase 1 document indicated that several small spills of nitrate-bearing wastes occurred around the outside of Building 123 These wastes may have contained radionuclides No documentation was found which supported the occurrence of individual spills associated with some type of waste management practice outside of Building 123 None of the people interviewed had knowledge of such spills, nor could the interviewees identify a plausible reason or cause for such spills The reason for this is that Building 123 has been serviced with a process waste collection system that has always allowed for the collection of process wastes (including nitrate bearing wastes) from very close to the point of generation. However, the interviewees were knowledgeable regarding the potential release of nitrate-bearing wastes through the original process waste pipeline buried beneath Building 123 This pipeline was a part of the OWPL, and was in use from the start of operations in Building 123 until the OPWLs were replaced by the new process waste lines The abandonment of the OWPLs beneath Building 123 occurred no later than February 1975 when engineering drawings were completed that documented the abandonment of the original process waste system OWPLs were typically abandoned in-place (DOE, 1992)

Building 123 was constructed as a laboratory and was one of the first buildings at the RFETS When constructed, the building consisted of a north wing running east-west and an east wing running north-south A west wing running north-south was added onto the west end of the north wing in the late 1960's (probably 1968) and an addition to the south end of the east wing was added in approximately 1972 The building was serviced by a process waste line of four-inch diameter buried beneath the north and east wings of the building The main process waste line drained from west to east in the north wing, and from north to south in the east wing The pipe was sloped at 1% A number of connections were made to this main pipe, some of which consisted of headers servicing a number of process waste drains in the building The pipe was probably constructed of a type of iron called "Duriron " The OPWL piping from Building 123 lead to an underground tank system behind Building 441 (IHSS 122) that collected wastes generated by both Buildings 123 and 441 From this tank system the process waste materials were pumped out for treatment in the process waste system (DOE, 1992)

The OPWL drain was not double-contained, and varied in depth beneath the floor of Building 123 from approximately one-half foot to three feet beneath the bottom of the concrete floor of the building The line came out from beneath the south end of the east wing of the building, with an invert elevation of approximately 6032 5 ft It has been stated by recent interviewees that this line, being constructed of a type of iron, probably leaked considerable amounts of waste without personnel being aware of the leak The types of waste carried by the pipe consisted of laboratory wastes from analysis of urine, fecal and other bioassay samples Nitrates and low levels of radionuclides were associated with the wastes carried in the OPWL The process waste lines that replaced the OPWLs consisted of either double-contained or overhead lines Leakage from the new process waste lines were easily detected The process waste line piping in the west wing, being newer, never included the use of an iron pipe directly in contact with soils (DOE, 1992)

Waste chemicals from the laboratory, such as a nitric acid mixed with ether, were sometimes disposed out the window during the early years of plant operation This activity could lead to the presence of non-radioactive pollutants under the building The Health Physics Laboratory generates low-level radioactive liquid waste and chemical waste Known or suspected underground waste line leakage has contributed some material to the soil beneath the building (DOE, 1992)

IHSS 121 includes the underground OPWLs P-1, P-2, and P-3 Leakage from OWPLs (IHSS 121) and possible spills from operations may have resulted in contaminated soil adjacent to beneath and beneath Building 123 These potentially contaminated soil have been combined with IHSS 148 soils and ranked according to RFCA action levels as UBC 123 for ranking to determine remediation prioritization (RMRS, 1998b)

Physical/Chemical Description of Constituents Released

Building 123, the Health Physics Laboratory, generated low-level radioactive wastes as well as chemical wastes The released materials were identified as nitrate wastes which may have contained radionuclides No documentation was found which detailed the nitrate concentration and activity levels of the wastes However, based on available information it appears that any wastes released would have consisted of liquid process wastes from the laboratory operations in Building 123 (DOE, 1992)

The types of waste carried by the pipe consisted of laboratory wastes from analysis of urine, fecal and other bioassay samples Nitrates and low levels of radionuclides were associated with the wastes carried in the OPWL (DOE, 1992)

Responses to Operation or Occurrence

No documentation was found which detailed responses to the suspected releases (DOE, 1992) D&D of Building 123 and the surrounding area was completed in 1998 The project removed Buildings 123, 123S, 113, and 114 The Building 123 slab and foundation were cored to assess potentially contaminated soils beneath the slab Areas of the slab which could not be

decontaminated to unrestricted release conditions were encapsulated with epoxy paint to fix any removable contamination and covered with a steel plate The overall project was conducted as an accelerated action under CERCLA-approved Building 123 PAM (RMRA, 1998b) The Building 123 PAM also references closure of RCRA Unit 40 (RMRS, 1998c)

Preliminary soil characterization of the Building 123 area, which includes IHSS 148 and UBC 123 and the portion of IHSS 121 associated with the area, was conducted as part of the activities outlined in the Building 123 PAM Soil characterization included sampling and analysis of the soil beneath and surrounding the Building 123 Following removal of the building superstructure, samples were collected through the slab A total of 48 soil samples were collected beneath the slab of Building 123 and from areas surrounding underground, abandoned OPWLs Composite samples were collected from one to six feet in depth with the intent of locating contamination that may have leaked from the lines Samples were analyzed for VOCs, SVOCs, Target Analyte List Metals, radionuclides, and nitrates (RMRS, 1998a, RMRS, 1998b) Six groundwater-monitoring wells were also established and sampled

Fate of Constituents Released to Environment

Sample results will be evaluated to determine impact to the environment and residual contamination associated with the IHSSs/UBC (RMRS, 1998b)

Action/No Further Action Recommendation

Sample results will be used to evaluate IHSS 148 and 121, and UBC 123 The ER Ranking List will be modified to reflect the findings (RMRS, 1998b)

Comments

IHSS 148, UBC 123 (which includes the sumps of RCRA Unit 40), and the portion of IHSS 121 associated with the area have been consolidated as one study area for the purpose of ER Ranking and, as a result, any remedial action, if warranted Rationale for the consolidation of these areas is as follows (KH, 1998)

- A high percentage of the IHSS 121 OWPL within the Building 123 footprint are also within IHSS 148 IHSS 148 and the portion of IHSS 121 are co-located In addition, both IHSSs 148 and 121 are located in the UBC 123
- The Room 125 Sump (RCRA Unit 40) is located within IHSS 148
- The underground pipe from Room 158, Building 123 to Tank D853 is outside of the building footprint and will likely be remediated with other outside OWPLs of IHSS 121 As a result this pipeline is not included in the consolidated study area

- Concurrence from CDPHE on the consolidation was received (verbally) on August 18, 1998 (KH, 1998)

References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

KH, 1998, Electronic mail message from L Brooks, KH, to S Paris, V Guthrie, T Hopkins, N Demos, J Law, G DiGregorio RE Building 123 ER Ranking Task, August 18

RMRS, 1998a, *Soil Sampling and Analysis Plan to Characterize IHSSs 121 and 148 at Building 123*, RF/RMRS-97-023, Rocky Flats Environmental Technology Site, Golden, CO

RMRS, 1998b, *Draft Final Close-out Report Building 123 Decommissioning Project*, Revision 0, Rocky Flats Environmental Technology Site, Golden, CO

RMRS, 1998c, *Closure Plan for Building 123 Components of RCRA Unit 40*, RF/RMRS-97-052, Rocky Flats Environmental Technology Site, Golden, CO

TABLE 1

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NORTHEAST BUFFER ZONE							
110	BZ	NE-110	Trench T-3	HRR[1]	Annual 1996[2] Annual 1997[3]	Annual 1997	-
111 1	BZ	NE-111 1	Trench T-4	HRR	Annual 1996 Annual 1997	Annual 1997	-
111 2	BZ	NE-111 2	Trench T-5	HRR	-	-	-
111 3	BZ	NE-111 3	Trench T-6	HRR	-	-	-
111 4	BZ	NE-111 4	Trench T-7	HRR	-	-	-
111 5	BZ	NE-111 5	Trench T-8	HRR	-	-	-
111 6	BZ	NE-111 6	Trench T-9	HRR	-	-	-
111 7	BZ	NE-111 7	Trench T-10	HRR	-	-	-
111 8	BZ	NE-111 8	Trench T-11	HRR	-	-	-
142 1	6	NE-142 1	Pond A-1	HRR	Annual 1997	Annual 1997	-
142 2	6	NE-142 2	Pond A-2	HRR	Annual 1997	Annual 1997	-
142 3	6	NE-142 3	Pond A-3	HRR	Annual 1997	Annual 1997	-
142 4	6	NE-142 4	Pond A-4	HRR	Annual 1997	Annual 1997	-
142 5	6	NE-142 5	Pond B-1	HRR	Annual 1997	Annual 1997	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
142 6	6	NE-142 6	Pond B-2	HRR	Annual 1997	Annual 1997	-
142 7	6	NE-142 7	Pond B-3	HRR	Annual 1997	Annual 1997	-
142 8	6	NE-142 8	Pond B-4	HRR	Annual 1997	Annual 1997	-
142 9	6	NE-142 9	Pond B-5	HRR	Annual 1997	Annual 1997	-
142 12	6	NE-142 12	Flume Pond (IAG Name Newly Identified Pond A-5) (Off-scale of Plate #2)	HRR	Annual 1996	Annual 1996	
156 2	6	NE-156 2	Soil Dump Area between the A and B Series Drainages	HRR	Annual 1997	Annual 1997	-
166 1	6	NE-166 1	Trench A	HRR	Annual 1996	Annual 1996	-
166 2	6	NE-166 2	Trench B	HRR	Annual 1996	Annual 1996	-
166 3	6	NE-166 3	Trench C (2 areas designated on Plate #2)	HRR	Annual 1996	Annual 1996	-
167 1	6	NE-167 1	Landfill North Area Spray Field	HRR	Annual 1997	Annual 1997	-
167 2	7	NE-167 2	Pond Area Spray Field (Center Area)	HRR	Annual 1996	Annual 1996	-
167 3	7	NE-167 3	South Area Spray Field	HRR	Annual 1996	Annual 1996	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
216.1	6	NE-216.1	East Spray Fields - North Area	HRR	Annual 1996	Annual 1996	-
216.2	BZ	NE-216.2	East Spray Field	HRR	Annual 1997	Annual 1997	-
216.3	BZ	NE-216.3	East Spray Field	HRR	Annual 1997	Annual 1997	-
NA	BZ	NE-1400	Tear Gas Powder Release	HRR	-	-	EPA, 1992[4]
NA	BZ	NE-1401	NE Buffer Zone Gas Line Break	HRR	-	-	EPA, 1992
NA	BZ	NE-1402	East Inner Gate PCB Spill	HRR	-	-	EPA, 1992
NA	BZ	NE-1403	Gasoline Spill - Building 920 Guard Post	HRR	-	-	EPA, 1992
142.6	BZ	NE-1404	Diesel Spill at Pond B-2 Spillway	Quarterly 2[3]	Quarterly 3[6] Annual 1998[7]	Annual 1998	-
NA	BZ	NE-1405	Diesel Fuel Spill at Field Treatability Unit (Identified as NE-1404; reassigned NE-1405 in Quarterly 7)	Quarterly 3	Quarterly 4[8] Quarterly 7[9] Annual 1998	Annual 1998	-
NA	BZ	NE-1406	771 Hillside Sludge Release	Quarterly 4	Annual 1998	Annual 1998	-
NA	BZ	NE-1407	OU 2 Treatment Facility	Quarterly 4	Quarterly 7 (900-1312) Quarterly 8 (900-1309)	-	-
NA	BZ	NE-1408	OU 2 Test Well (formerly NE-1406)	Quarterly 4	Quarterly 7	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	BZ	NE-1409	Modular Tanks and 910 Treatment System Spill (formerly 000-503)	Quarterly 5[10]	Quarterly 7	-	-
NA	BZ	NE-1410	Diesel Fuel Spill at Field Treatability Unit	Quarterly 7	-	Quarterly 7	-
NA	BZ	NE-1411	Diesel Fuel Overflowed from Tanker at OU 2 Field Treatability Unit	Quarterly 7	-	Quarterly 7	-
NA	BZ	NE-1412	Trench T-12 Located in OU-2 East Trenches	Quarterly 10[11]	-	-	-
NA	BZ	NE-1413	Trench T-13 Located in OU-2 East Trenches	Quarterly 10	-	-	-
NORTHWEST BUFFER ZONE							
114	7	NW-114	Present Landfill	HRR	-	-	-
170	BZ	NW-170	PU&D Storage Yard - Waste Spills	HRR	Annual 1997 Annual 1998	Annual 1998	-
174	BZ	NW-174	PU&D Container Storage Facilities (2) (originally identified as 174; 2 locations designated as 174A and 174B)	HRR	Annual 1997 Annual 1998	Annual 1998	-
195	16	NW-195	Nickel Carbonyl Disposal	HRR	Annual 1996	Annual 1996	OU 16 CAD/ROD[12]
203	7	NW-203	Inactive Hazardous Waste Storage Area	HRR	Annual 1996 Annual 1998	Annual 1998	-
NA	BZ	NW-1500	Diesel Spill at PU&D Yard (formerly NW-175)	Quarterly 3	Quarterly 7 Annual 1998	Annual 1998	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	BZ	NW-1501	Asbestos Release at PU&D Yard (formerly NW-176)	Quarterly 3	Quarterly 7	-	-
114	7	NW-1502	Improper Disposal of Diesel-Contaminated Material at Landfill (formerly NW-177)	Quarterly 2	Quarterly 3 Quarterly 7	Quarterly 7	-
114	7	NW-1503	Improper Disposal of Fuel Contaminated Material at Landfill	Quarterly 1	Quarterly 7	Quarterly 7	-
114	7	NW-1504	Improper Disposal of Thorosilane Contaminated Material at Landfill	Quarterly 7	-	Quarterly 7	-
SOUTHEAST BUFFER ZONE							
142 10	5	SE-142 10	Pond C-1	HRR	Annual 1997	Annual 1997	-
142 11	5	SE-142 11	Pond C-2	HRR	Annual 1997	Annual 1997	-
209	5	SE-209	Surface Disturbance Southeast of Bldg 881	HRR	Annual 1997	Annual 1997	-
NA	BZ	SE-1600	Pond 7 – Steam Condensate Releases	HRR	-	-	EPA, 1992
NA	BZ	SE-1601	Pond 8 - Cooling Tower Discharge Releases (2 locations designated as SE-1601 1 and SE-1601 2)	HRR	-	-	EPA, 1992
SOUTHWEST BUFFER ZONE							
115	IA	SW-115	Original Landfill	HRR	-	-	-
133 1	5	SW-133 1	Ash Pit 1	HRR	-	-	-
133 2	5	SW-133 2	Ash Pit 2	HRR	-	-	-
133 3	5	SW-133 3	Ash Pit 3	HRR	-	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
133 4	5	SW-133 4	Ash Pit 4	HRR	-	-	-
133 5	5	SW-133 5	Incinerator Facility	HRR	Annual 1997	Annual 1997	-
133 6	5	SW-133 6	Concrete Wash Pad	HRR	Annual 1997	Annual 1997	-
196	IA	SW-196	Water Treatment Plant Backwash Pond	HRR	-	-	-
NA	BZ	SW-1700	Fuel Spill into Woman Creek Drainage	HRR	-	-	EPA, 1992
NA	BZ	SW-1701	Recently Identified Ash Pit (also referred to as TDEM-1)	Quarterly 9[13]	Annual 1997	Annual 1997	-
NA	BZ	SW-1702	Recently Identified Ash Pit (also referred to as TDEM-2)	Quarterly 9	-	-	-
000 AREA							
101	IA	000-101	207 Solar Evaporation Ponds	HRR	Annual 1998	-	-
121	IA	000-121	Original Process Waste Lines	HRR	Annual 1996 Annual 1998 (UBC 123)	-	-
162	IA	000-162	Radioactive Site - 700 Area Site # 2	HRR	-	-	-
168	11	000-168	West Spray Field	HRR	Annual 1996	Annual 1996	OU 11 CAD/ROD[14]
172	IA	000-172	Central Avenue Waste Spill	HRR	Annual 1998	Annual 1998	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
190	IA	000-190	Caustic Leak (also referred to as Central Avenue Ditch)	HRR	-	-	-
192	16	000-192	Antifreeze Discharge	HRR	Annual 1996	Annual 1996	OU 16 CAD/ROD
NA	IA	000-500	Sanitary Sewer System (not shown on Plate 4)	HRR	-	-	-
NA	BZ	000-501	Roadway Spraying	HRR	-	-	EPA, 1992
NA	IA	000-502 (see 900-1310)	ITS Water Spill (identified as 000-502 in Quarterly 2, reassigned 900-1310 in Quarterly 7, 000-502 was not reassigned)	Quarterly 2	NA	NA	NA
NA	IA	000-503	Solar Pond Water Spill Along Central Avenue	Quarterly 7	-	Quarterly 7	-
100 AREA							
148	IA	100-148	Waste Spills	HRR	Annual 1998 (UBC 123)	-	-
NA	IA	100-600	Mercury Spill – Valve Vault 124-B, Building 124	HRR	-	-	EPA, 1992
NA	IA	100-601	Building 123 Phosphoric Acid Spill	HRR	-	-	EPA, 1992
NA	IA	100-602	Building 123 Process Waste Line Break	HRR	-	-	-
NA	IA	100-603	Building 123 Bioassay Waste Spill	HRR	-	-	-
NA	IA	100-604	T130 Complex Sewer Line Leaks	HRR	-	-	EPA, 1992
NA	IA	100-605	Building 115 Hydraulic Oil Spill	HRR	-	-	EPA, 1992
NA	IA	100-606	Building 125 TCE Spill	HRR	-	-	EPA, 1992
NA	IA	100-607	Building 111 Transformer PCB Leak	HRR	-	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	100-608	Building 131 Transformer Leak	HRR	Annual 1998	Annual 1998	-
NA	IA	100-609	Building 121 Security Incinerator	HRR	-	-	-
NA	IA	100-610	Asbestos Release – Building 123	HRR	-	-	EPA, 1992
NA	IA	100-611	Building 123 Scrubber Solution Spill	HRR	-	-	-
NA	IA	100-612	Battery Solution Spill - Building 119	HRR	-	-	EPA, 1992
NA	IA	100-613	Asphalt Surface in Lay Down Yard North of Building 130 (identified as 000-501 in Quarterly 4, reassigned as100-613 in Quarterly 7)	Quarterly 4	Quarterly 7	Quarterly 7	-
300 AREA							
128	IA	300-128	Oil Burn Pit No 1	HRR	-	-	-
134	IA	300-134	Lithium Metal Destruction Site [2 locations designated as 134(N) and 134(S)]	HRR	-	-	-
135	IA	300-135	Cooling Tower Blowdown	HRR	Annual 1997	Annual 1997	-
151	IA	300-151	Tank 262 Fuel Oil Spills	HRR	Annual 1997	Annual 1997	-
156 1	IA	300-156 1	Building 371 Parking Lot (2 locations designated on Plate #2)	HRR	Annual 1997	Annual 1997	-
171	IA	300-171	Solvent Burning Ground	HRR	-	-	-
181	IA	300-181	Building 334 Cargo Container Area	HRR	Annual 1997	Annual 1997	-
186	IA	300-186	Valve Vault 12	HRR	-	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
188	IA	300-188	Acid Leak	HRR	Annual 1997	Annual 1997	-
206	IA	300-206	Inactive D-836 Hazardous Waste Tank	HRR	-	-	-
212	IA	300-212	Building 371 Drum Storage Area, Unit 63 (deferred to Part VIII of the RFETS RCRA Mixed Residues Modification, see Annual 1997)	HRR	Annual 1997	Annual 1997	-
NA	IA	300-700	Scrap Roofing Disposal	HRR	-	-	EPA, 1992
NA	IA	300-701	Sulfuric Acid Spill – Building 371	HRR	-	-	EPA, 1992
NA	IA	300-702	Pesticide Shed	HRR	-	-	-
NA	IA	300-703	Building 331 North Area	HRR	-	-	EPA, 1992
NA	IA	300-704	Roof Fire, Building 381	HRR	-	-	EPA, 1992
NA	IA	300-705	Potassium Hydroxide Spill North of Building 374	HRR	-	-	EPA, 1992
NA	IA	300-706	Evaporator Tanks North of Building 374	HRR	-	-	EPA, 1992
NA	IA	300-707	Sanitizer Spill	HRR	-	-	EPA, 1992
NA	IA	300-708	Transformers North of Building 371	HRR	Annual 1996	Annual 1996	-
NA	IA	300-709	Transformer Leak 334-1	HRR	Annual 1996	Annual 1996	-
NA	IA	300-710	Gasoline Spill North of Building 331	HRR	-	-	EPA, 1992
NA	IA	300-711	Ni-Cad Battery Spill Outside of Building 373	Quarterly 1	Quarterly 7	Quarterly 7	-
NA	IA	300-712	1/2 gal Antifreeze Spilled by Street Sweeper Outside of Building 373	Quarterly 7	-	Quarterly 7	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	300-713	Caustic Spill North of Building 331	Quarterly 8[15]	-	Quarterly 8	-
NA	IA	300-714	Laundry Waste Water Spill From Tank T-803, North of Building 374	Quarterly 10	-	Quarterly 10	-
NA	IA	300-715	Battery Acid Spill	Annual 1997	-	Annual 1997	-
			400 AREA				
116 1	IA	400-116 1	West Loading Dock, Building 447 (IAG Name West Loading Dock Area)	HRR	-	-	-
116 2	IA	400-116 2	South Loading Dock, Building 444 (IAG Name South Loading Dock Area)	HRR	-	-	-
122	IA	400-122	Underground Concrete Tank	HRR	Annual 1996 (000-121)	-	-
129	IA	400-129	Building 443 Oil Leak (deferred to IA OU, see Annual 1997)	HRR	Annual 1996 Annual 1997	-	-
136 1	IA	400-136 1	Cooling Tower Pond West of Building 444 (IAG Name Cooling Tower Pond Northeast Corner of Building 460)	HRR	-	-	-
136 2	IA	400-136 2	Cooling Tower Pond East of Building 444 (IAG Name Cooling Tower Pond West of Building 460)	HRR	-	-	-
157 1	IA	400-157 1	Radioactive Site North Area	HRR	-	-	-
157 2	IA	400-157 2	Radioactive Site South Area	HRR	-	-	-
182	IA	400-182	Building 444/453 Drum Storage Area	HRR	-	-	-
187	IA	400-187	Sulfuric Acid Spill (IAG Name Acid Leaks (2))	HRR	-	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
191	IA	400-191	Hydrogen Peroxide Spill	HRR	Annual 1997	Annual 1997	-
193	16	400-193	Steam Condensate Leak	HRR	Annual 1996	Annual 1996	OU 16 CAD/ROD
204	15	400-204	Original Uranium Chip Roaster (deferred to D&D and UBC 447, see OU 15 CAD/ROD)	HRR	Annual 1996	Annual 1996	-
205	IA	400-205	Building 460 Sump #3 Acid Side	HRR	-	-	-
207	IA	400-207	Inactive 444 Acid Dumpster	HRR	-	-	-
208	IA	400-208	Inactive 444/447 Waste Storage Area	HRR	-	-	-
NA	IA	400-800	Transformer 443-1	HRR	Annual 1998	Annual 1998	-
NA	IA	400-801	Transformer, Roof of Building 447	HRR	-	-	-
NA	IA	400-802	Storage Area, South of Building 334	HRR	-	-	-
NA	IA	400-803	Miscellaneous Dumping, Building 460 Storm Drain	HRR	-	-	-
NA	IA	400-804	Road North of Building 460	HRR	-	-	-
NA	IA	400-805	Building 443 Tank #9 Leak	HRR	-	-	EPA, 1992
NA	IA	400-806	Catalyst Spill, Building 440	HRR	-	-	EPA, 1992
NA	IA	400-807	Sandblasting Area	HRR	-	-	-
NA	IA	400-808	Vacuum Pump Leak - Building 442	HRR	-	-	EPA, 1992
NA	IA	400-809	Oil Leak - 446 Guard Post	HRR	-	-	EPA, 1992
NA	IA	400-810	Beryllium Fire - Building 444	HRR	-	-	-
NA	IA	400-811	Transformer 443-2, Building 443	Quarterly 2	Quarterly 3 Annual 1998	Annual 1998	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	400-812	Tank T-2 Spill in Building 460	Quarterly 6[16]	Quarterly 7 Quarterly 8	Quarterly 8	-
NA	IA	400-813	RCRA Tank Leak in Building 460	Quarterly 7	-	-	-
NA	IA	400-814	Air Conditioner Compressor Release, Bldg 444 Roof	Quarterly 8	-	Quarterly 8	-
NA	IA	400-815	RCRA Tank Leak in Building 460	Quarterly 8	-	-	-
NA	IA	400-820 (see 600-1004)	Central Avenue Ditch Soil Spreading (identified in Quarterly 6 as 400-800, reassigned as 600-1004 in Quarterly 7, 400-820 has not been reassigned)	Quarterly 6	Quarterly 7	NA	NA
500 AREA							
117 1	IA	500-117 1	North Site Chemical Storage	HRR	-	-	-
117 2	IA	500-117 2	Middle Site Chemical Storage	HRR	-	-	-
158	IA	500-158	Radioactive Site – Building 551	HRR	-	-	-
159	IA	500-159	Radioactive Site – Building 559	HRR	-	-	-
169	IA	500-169	Waste Drum Peroxide Burial	HRR	Annual 1998	Annual 1998	-
197	IA	500-197	Scrap Metal Sites	HRR	-	-	-
NA	IA	500-900	Transformer Leak – 515/516	HRR	Annual 1996	Annual 1996	-
NA	IA	500-901	Transformer Leak – 555	HRR	Annual 1996	Annual 1996	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	500-902	Transformer Leak – 559	HRR	Annual 1996	Annual 1996	-
NA	IA	500-903	RCRA Storage Unit #1	HRR	-	-	EPA, 1992
NA	IA	500-904	Transformer Leak – 223-1/223-2	HRR	-	-	-
NA	IA	500-905	Transformer Leak – 558-1	HRR	Annual 1996	Annual 1996	-
NA	IA	500-906	Asphalt Surface Near Building 559	Quarterly 4	-	-	-
172	IA	500-907	Tanker Truck Release of Hazardous Waste From Tank 231B	Quarterly 9	-	-	-
156 1, 186	IA	500-908	Oil Released from Air Compressor	Quarterly 12[17]	-	Quarterly 12	-
158	IA	500-909	Release of Spent Photographic Fixer Solution	Annual 1996	-	Annual 1996	-
600 AREA							
117 3	IA	600-117 3	Chemical Storage – South Site	HRR	Annual 1997	Annual 1997	-
120 1	IA	600-120 1	Fiberglassing Area North of Building 664	HRR	-	-	-
120 2	IA	600-120 2	Fiberglassing Area West of Building 664	HRR	-	-	-
152	IA	600-152	Fuel Oil Tank 221 Spills	HRR	Annual 1997	Annual 1997	-
160	IA	600-160	Radioactive Site Building 444 Parking Lot	HRR	-	-	-
161	IA	600-161	Radioactive Site - Building 664	HRR	-	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
164 1	IA	600-164 1	Radioactive Slab from Bldg 776	HRR	Annual 1997	Annual 1997	-
189	IA	600-189	Nitric Acid Tank	HRR	Annual 1997	Annual 1997	-
NA	IA	600-1000	Transformer Storage Building 662	HRR	Annual 1996	Annual 1996	-
NA	IA	600-1001	Temporary Waste Storage Building 663	HRR	Annual 1997	-	-
NA	IA	600-1002	Transformer Storage - West of Building 666	HRR	Annual 1996	Annual 1996	-
NA	IA	600-1003	Transformers North and South of 661-675 Substation	HRR	Annual 1996	Annual 1996	-
152, 157 1, 172	IA	600-1004	Central Avenue Ditch Cleaning Incident (formerly identified as 400-820)	Quarterly 6	Quarterly 7	-	-
NA	IA	600-1005	Former Pesticide Storage Area	Quarterly 7	-	-	-
700 AREA							
118 1	IA	700-118 1	Multiple Solvent Spills West of Building 730	HRR	Annual 1998	-	-
118 2	IA	700-118 2	Multiple Solvent Spills South End of Building 776	HRR	-	-	-
123 1	IA	700-123 1	Valve Vault 7	HRR	Annual 1997	Annual 1997	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
123 2	IA	700-123 2	Valve Vault West of Building 707	HRR	-	-	-
124 1	IA	700-124 1	30,000 Gallon Tank	HRR	Annual 1996 (000-121)	-	-
124 2	IA	700-124 2	14,000 Gallon Tank	HRR	Annual 1996 (000-121)	-	-
124 3	IA	700-124 3	14,000 Gallon Tank	HRR	Annual 1996 (000-121)	-	-
125	IA	700-125	Holding Tank	HRR	-	-	-
126 1	IA	700-126 1	Westernmost Out-of-Service Waste Tank	HRR	-	-	-
126 2	IA	700-126 2	Easternmost Out-of-Service Waste Tank	HRR	-	-	-
127	IA	700-127	Low-Level Radioactive Waste Leak	HRR	-	-	-
131	IA	700-131	Radioactive Site - 700 Area Site #1	HRR	-	-	-
132	IA	700-132	Radioactive Site - 700 Area Site #4	HRR	Annual 1996 (000-121) Annual 1997	-	-
137	IA	700-137	Cooling Tower Blowdown Buildings 712 and 713 (IAG Name Cooling Tower Blowdown Building 774)	HRR	-	-	-
138	IA	700-138	Cooling Tower Blowdown Building 779	HRR	-	-	-
139 1	IA	700-139 1	Caustic/Acid Spills Hydroxide Tank Area [identified as 139 1(N) and 139 1(S)]	HRR	-	-	-
139 2	IA	700-139 2	Caustic/Acid Spills Hydrofluoric Acid Tanks	HRR	-	-	-
143	IA	700-143	Bldg 771 Outfall	HRR	Annual 1997	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
144	IA	700-144	Sewer Line Overflow (IAG Name Sewer Line Break) [also referred to as 144(N) and 144(S)]	HRR	-	-	-
146 1	IA	700-146 1	Concrete Process Waste Tanks 7,500 Gallon Tank (31)	HRR	-	-	-
146 2	IA	700-146 2	Concrete Process Waste Tanks 7,500 Gallon Tank (32)	HRR	-	-	-
146 3	IA	700-146 3	Concrete Process Waste Tanks 7,500 Gallon Tank (34W)	HRR	-	-	-
146 4	IA	700-146 4	Concrete Process Waste Tanks 7,500 Gallon Tank (34E)	HRR	-	-	-
146 5	IA	700-146 5	Concrete Process Waste Tanks 3,750 Gallon Tank (30)	HRR	-	-	-
146 6	IA	700-146 6	Concrete Process Waste Tanks 3,750 Gallon Tank (33)	HRR	-	-	-
147 1	IA	700-147 1	Process Waste Line Leaks (IAG Name Maas Area)	HRR	-	-	-
149	IA	700-149	Effluent Pipe (also referred to as 149 1 and 149 2)	HRR	-	-	-
150 1	IA	700-150 1	Radioactive Site North of Building 771 (IAG Name Radioactive Leak North of Building 771)	HRR	-	-	-
150 2	IA	700-150 2	Radioactive Site West of Buildings 771 and 776 (IAG Name Radioactive Leak West of Building 771)	HRR	-	-	-
150 3	IA	700-150 3	Radioactive Site Between Buildings 771 & 774 (IAG Name Radioactive Leak Between Buildings 771 & 774)	HRR	-	-	-
150 4	IA	700-150 4	Radioactive Site Northwest of Building 750 (IAG Name Radioactive Leak East of Building 750)	HRR	-	-	-
150.5	IA	700-150.5	Radioactive Site West of Building 707 (IAG Name Radioactive Leak West of Building 707)	HRR	Annual 1998	Annual 1998	-
150 6	IA	700-150 6	Radioactive Site South of Building 779 (IAG Name Radioactive Leak South of Building 779)	HRR	-	-	-
150 7	IA	700-150 7	Radioactive Site South of Building 776 (IAG Name Radioactive Leak South of Building 776)	HRR	-	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
150 8	IA	700-150 8	Radioactive Site Northeast of Building 779 (IAG Name Radioactive Leak Northeast of Building 779)	HRR	-	-	-
163 1	IA	700-163 1	Radioactive Site 700 Area Site No 3 Wash Area	HRR	-	-	-
163 2	IA	700-163 2	Radioactive Site 700 Area Site No 3 Buried Slab	HRR	-	-	-
185	16	700-185	Solvent Spill	HRR	Annual 1996	Annual 1996	OU 16 CAD/ROD
194	16	700-194	Steam Condensate Leak	HRR	Annual 1996	Annual 1996	OU 16 CAD/ROD
214	IA	700-214	750 Pad Pondcrete & Saltcrete Storage, Unit 25	HRR	-	-	-
215	IA	700-215	Tank T-40, Unit 55 13	HRR	-	-	-
NA	IA	700-1100	French Drain North of Building 776/777	HRR	-	-	-
NA	IA	700-1101	Laundry Tank Overflow - Building 732	HRR	-	-	-
NA	IA	700-1102	Transformer Leak – 776-4	HRR	Annual 1996 Annual 1997	Annual 1997	-
NA	IA	700-1103	Leaking Transformers - Building 707	HRR	Annual 1996	Annual 1996	-
NA	IA	700-1104	Leaking Transformers - Building 708	HRR	Annual 1996	Annual 1996	-
NA	IA	700-1105	Transformer Leak - 779-1/779-2	HRR	-	-	-
NA	IA	700-1106	Process Waste Spill - Portal 1	HRR	-	-	-
NA	IA	700-1107	Compressor Waste Oil Spill - Building 776	HRR	-	-	EPA, 1992
NA	IA	700-1108	771/774 Footing Drain Pond	HRR	-	-	-
NA	IA	700-1109	Uranium Incident - Building 778	HRR	-	-	EPA, 1992
NA	IA	700-1110	Nickel Carbonyl Burial West of Building 771	HRR	-	-	EPA, 1992

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	700-1111	Leaking Transformer - Building 750	HRR	Annual 1996	Annual 1996	-
NA	IA	700-1112	Leaking Transformer - 776-5	HRR	Annual 1996	Annual 1996	-
101	IA	700-1113	Water Released from 207C Solar Evaporation Pond	Quarterly 11[18]	-	Quarterly 11	-
NA	IA	700-1114	Release During Liquid Transfer Operations from Bldg 774 (also referred to 700-1114a and 700-1114b)	Annual 1997	-	Annual 1997	-
NA	IA	700-1115	Identification of Diesel Fuel in Subsurface Soils	Annual 1997	-	-	-
150.7	IA	700-1116	Leaking Transformer South of Building 776	Annual 1998	-	-	-
NA	IA	700-1117	Building 701 Water Line, Soil Put-back	Annual 1998	-	Annual 1998	CDPHE 1998[19]
800 AREA							
102	1	800-102	Oil Sludge Pit	HRR	Annual 1997	Annual 1997	OU 1 CAD/ROD[20]
103	1	800-103	Chemical Burial	HRR	Annual 1997	Annual 1997	OU 1 CAD/ROD
104	1	800-104	Liquid Dumping	HRR	Annual 1997	Annual 1997	OU 1 CAD/ROD
105 1	1	800-105 1	Bldg 881 Westernmost Out of Service Fuel Tanks	HRR	Annual 1997	Annual 1997	OU 1 CAD/ROD

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
105 2	1	800-105 2	Bldg 881 Easternmost Out of Service Fuel Tanks	HRR	Annual 1997	Annual 1997	OU 1 CAD/ROD
106	1	800-106	Bldg 881, Outfall	HRR	Annual 1997	Annual 1997	OU 1 CAD/ROD
107	1	800-107	Bldg 881, Hillside Oil Leak	HRR	Annual 1997	Annual 1997	OU 1 CAD/ROD
145	1	800-145	Sanitary Waste Line Leak	HRR	Annual 1997	Annual 1997	OU 1 CAD/ROD
147 2	IA	800-147 2	Bldg Conversion Activity Contamination Area	HRR	Annual 1997	Annual 1997	-
164 2	IA	800-164 2	Radioactive Site 800 Area Site #2, Building 886 Spills	HRR	-	-	-
164 3	IA	800-164 3	Radioactive Site 800 Area Site #2, Building 889 Storage Pad	HRR	-	-	-
177	BZ	800-177	Building 885 Drum Storage and Paint Storage (IAG Name Building 885 Drum Storage Area)	HRR	-	-	-
178	15	800-178	Building 881 Drum Storage Area	HRR	Annual 1996	Annual 1996	OU 15 CAD/ROD[21]
179	15	800-179	Building 865 Drum Storage Area (defer to D&D and UBC 447, refer to OU 15 CAD/ROD)	HRR	Annual 1996	Annual 1996	-
180	15	800-180	Building 883 Drum Storage Area (defer to D&D and UBC 447, refer to OU 15 CAD/ROD)	HRR	Annual 1996	Annual 1996	-
211	15	800-211	Building 881 Drum Storage, Unit 26	HRR	Annual 1996	Annual 1996	OU 15 CAD/ROD
217	15	800-217	Building 881, CN^- Bench Scale Treatment, Unit 32	HRR	Annual 1996	Annual 1996	OU 15 CAD/ROD

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	800-1200	Valve Vault 2	HRR	-	-	-
NA	IA	800-1201	Radioactive Site South of Building 883	HRR	-	-	-
NA	IA	800-1202	Sulfuric Acid Spill, Building 883	HRR	-	-	EPA, 1992
NA	IA	800-1203	Sanitary Sewer Line Break Between Buildings 865 and 886	HRR	-	-	EPA, 1992
NA	IA	800-1204	Building 866 Spills	HRR	-	-	-
NA	IA	800-1205	Building 881, East Dock	HRR	-	-	-
NA	IA	800-1206	Fire, Building 883	HRR	-	-	EPA, 1992
NA	IA	800-1207	Transformer 883-4	HRR	Annual 1996	Annual 1996	-
NA	IA	800-1208	Transformer 881-4	HRR	Annual 1996	Annual 1996	-
NA	IA	800-1209	Leaking Transformers, 800 Area	HRR	Annual 1996	Annual 1996	-
NA	IA	800-1210	Transformer 865-1 and 865-2	HRR	Annual 1996	Annual 1996	-
NA	IA	800-1211	Capacitor Leak, Building 883	HRR	-	-	EPA, 1992
NA	IA	800-1212	Building 866 Sump Spill	Quarterly 5	-	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
900 AREA							
108	IA	900-108	Trench T-1	HRR	Annual 1997 Annual 1998	-	-
109	BZ	900-109	Trench T-2 - Ryan's Pit	HRR	Annual 1996 Annual 1997	Annual 1997	-
112	BZ	900-112	903 Pad (IAG Name: 903 Drum Storage Area)	HRR	Annual 1997 Annual 1998	-	-
113	BZ	900-113	Mound Area	HRR	Annual 1997	Annual 1997	-
119.1	1	900-119.1	West Scrap Metal Storage Area and Solvent Spill	HRR	Annual 1996 Annual 1997 Annual 1998	-	-
119 2	1	900-119 2	East Scrap Metal Storage Area and Solvent Spill	HRR	Annual 1996 Annual 1997	Annual 1997	OU 1 CAD/ROD
130	1	900-130	Contaminated Soil Disposal Area East of Bldg 881	HRR	Annual 1997	Annual 1997	OU 1 CAD/ROD
140	BZ	900-140	Hazardous Disposal Area (IAG Name: Reactive Metal Destruction Site)	HRR	Annual 1997 Annual 1998	Annual 1998	-
141	6	900-141	Sludge Disposal	HRR	Annual 1997	Annual 1997	-
153	IA	900-153	Oil Burn Pit No 2	HRR	-	-	-
154	IA	900-154	Pallet Burn Site	HRR	-	-	-
155	BZ	900-155	903 Lip Area	HRR	Annual 1997 Annual 1998	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
165	6	900-165	Triangle Area	HRR	-	-	-
173	IA	900-173	South Dock - Building 991 (IAG Name Radioactive Site - 900 Area)	HRR	-	-	-
175	IA	900-175	S&W Building 980 Container Storage Facility	HRR	-	-	-
176	IA	900-176	S&W Contractor Storage Yard	HRR	-	-	-
183	BZ	900-183	Gas Detoxification Area	HRR	Annual 1997	Annual 1997	-
184	IA	900-184	Building 991 Steam Cleaning Area	HRR	-	-	-
210	IA	900-210	Building 980 Cargo Container, Unit 16	HRR	Annual 1997	Annual 1997	-
213	IA	900-213	Unit 15, 904 Pad Pondcrete Storage	HRR	-	-	-
NA	IA	900-1300	RO Plant Sludge Drying Beds	HRR	-	-	EPA, 1992
NA	IA	900-1301	Building 991 Enclosed Area	HRR	-	-	-
NA	IA	900-1302	Gasoline Spill	HRR	-	-	EPA, 1992
NA	IA	900-1303	Natural Gas Leak	HRR	-	-	EPA, 1992
NA	IA	900-1304	Chromic Acid Spill - Building 991	HRR	-	-	EPA, 1992
NA	IA	900-1305	Building 991 Roof	HRR	-	-	EPA, 1992
NA	IA	900-1306	Transformers 991-1 and 991-2	HRR	Annual 1996	Annual 1996	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	900-1307	Explosive Bonding Pit	HRR	-	-	-
NA	IA	900-1308	Gasoline Spill Outside of Building 980	Quarterly 6	Quarterly 8	-	-
NA	BZ	900-1309	OU 2 Field Treatability Unit Spill	Quarterly 6	Quarterly 7 (900-1312) Quarterly 8	-	-
NA	IA	900-1310	ITS Water Spill (identified as 000-502 in Quarterly 2, reassigned 900-1310 in Quarterly 7)	Quarterly 2	Quarterly 3 Quarterly 7	-	-
NA	IA	900-1311	Septic Tank East of Building 991	Quarterly 7	-	-	-
NA	IA	900-1312	OU-2 Water Spill	Quarterly 7	-	-	-
192	IA	900-1313	Seep Area Near OU-2 Influent	Quarterly 9	-	-	-
101	IA	900-1314	Solar Evaporation Pond 207B Sludge Release	Quarterly 9	-	Quarterly 9	-
NA	IA	900-1315	Tanker Truck Release on East Patrol Road, North of Spruce Ave	Quarterly 10	Quarterly 11	Quarterly 11	-
NA	BZ	900-1316	Elevated Chromium (total) Identified During Geotechnical Drilling	Quarterly 10	-	Quarterly 10	-
176	IA	900-1317	Soil Released from Wooden Crate in 964 Laydown Yard	Quarterly 11	-	Quarterly 11	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	900-1318	Release of F001 Listed Waste Water to Soil (identified as 900-1307 in Annual 1997, reassigned 900-1318 in Annual 1998)	Annual 1997	Annual 1998	Annual 1997	-
OFF-SITE AREA							
199	3	OFF-SITE AREA 1	Off-Site Area 1	HRR	Annual 1997	Annual 1997	OU 3 CAD/ROD[22]
200	3	OFF-SITE AREA 2	Great Western Reservoir	HRR	Annual 1997	Annual 1997	OU 3 CAD/ROD
201	3	OFF-SITE AREA 3	Standley Lake	HRR	Annual 1997	Annual 1997	OU 3 CAD/ROD
202	3	OFF-SITE AREA 4	Mower Reservoir	HRR	Annual 1997	Annual 1997	OU 3 CAD/ROD
UNDER BUILDING CONTAMINATION							
NA	IA	UBC-122	Building 122 (UBC-122)	HRR	-	-	-
NA	IA	UBC-123	Building 123 (UBC-123)	HRR	Annual 1998		
NA	IA	UBC-125	Building 125 (UBC-125)	HRR	-	-	-
NA	IA	UBC-331	Building 331 (UBC-331)	HRR	-	-	-
NA	IA	UBC-371	Building 371 (UBC-371)	HRR	-	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	UBC-374	Building 374 (UBC-374)	HRR	-	-	-
NA	IA	UBC-439	Building 439 (UBC-439)	HRR	-	-	-
NA	IA	UBC-440	Building 440 (UBC-440)	HRR	-	-	-
NA	IA	UBC-441	Building 441 UBC-441)	HRR	-	-	-
NA	IA	UBC-442	Building 442 (UBC-442)	HRR	-	-	-
NA	IA	UBC-444	Building 444 (UBC-444)	HRR	-	-	-
NA	IA	UBC-447	Building 447 (UBC-447)	HRR	-	-	-
NA	IA	UBC-528	Building 528 (UBC-528)	HRR	-	-	-
NA	IA	UBC-559	Building 559 (UBC-559)	HRR	-	-	-
NA	IA	UBC-701	Building 701 (UBC-701)	HRR	-	-	-
NA	IA	UBC-707	Building 707 (UBC-707)	HRR	-	-	-
NA	IA	UBC-731	Building 731 (UBC-731)	HRR	-	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	UBC-770	Building 770 UBC-770)	HRR	-	-	-
NA	IA	UBC-771	Building 771(UBC-771)	HRR	-	-	-
NA	IA	UBC-774	Building 774 (UBC-774)	HRR	-	-	-
NA	IA	UBC-776	Building 776 (UBC-776)	HRR	-	-	-
NA	IA	UBC-777	Building 777 (UBC-777)	HRR	-	-	-
NA	IA	UBC-778	Building 778 (UBC-778)	HRR	-	-	-
NA	IA	UBC-779	Building 779 (UBC-779)	HRR	-	-	-
NA	IA	UBC-865	Building 865 (UBC-865)	HRR	-	-	-
NA	IA	UBC-881	Building 881 (UBC-881)	HRR	-	-	-
NA	IA	UBC-883	Building 883 (UBC-883)	HRR	-	-	-
NA	IA	UBC-886	Building 886 (UBC-886)	HRR	-	-	-
NA	IA	UBC-887	Building 887 (UBC-887)	HRR	-	-	-

Table 1. CERCLA Sites at RFETS

IHSS	OU	PAC	Description	Identified	Updated	Proposed NFA	Approved NFA
NA	IA	UBC-889	Building 889 (UBC-889)	HRR	-	-	-
NA	IA	UBC-991	Building 991 (UBC-991)	HRR	-	-	-

1 *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO, June

2 *Annual Update for the Historical Release Report*, RF/ER-96-0046, Rocky Flats Environmental Technology Site, Golden, CO, September

3 *Annual Update for the Historical Release Report*, RF/RMRS-97-073 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

4 EPA, 1992 Correspondence to R Schassburger, DOE RFO, from M Hestmark, EPA Region VIII, RE Potential Area of Concern Needing Further Investigation , December 23

5 *Historical Release Report Second Quarterly Update, October 1, 1992 to January 1, 1993*

6 *Historical Release Report, Third Quarterly Update, January 1, 1993 to April 1, 1993*

7 *Annual Update for the Historical Release Report*, RF/RMRS-98-269 UN, Rocky Flats Environmental Technology Site, Golden, CO, September

8 *Historical Release Report, Fourth Quarterly Update, April 1, 1993 to July 1, 1993*

9 *Historical Release Report, Seventh Quarterly Update, January 1, 1994 to March 31, 1994*

10 *Historical Release Report, Fifth Quarterly Update, July 1, 1993 to October 1, 1993*

11 *Historical Release Report, Tenth Quarterly Update, October 1, 1994 to December 31, 1994*

12 *Corrective Action Decision/Record of Decision for OU16 Low Priority Sites*, Rocky Flats Environmental Technology Site, Golden, CO August

13 *Historical Release Report, Ninth Quarterly Update, July 1, 1993 to September 30, 1993*

14 *Operable Unit 11 Final Combined Phases RFI/RI Report*, Rocky Flats Environmental Technology Site, Golden, CO, June

15 *Historical Release Report, Eigth Quarterly Update, April 1, 1994 to June 30, 1994*

16 *Historical Release Report, Sixth Quarterly Update, October 1, 1993 to January 1, 1994*

17 *Historical Release Report, Twelfth Quarterly Update, April 1, 1995 to June 30, 1995*

18 *Historical Release Report, Eleventh Quarterly Update, January 1, 1995 to March 31, 1995*

19 CDPHE, 1998, *Excavated Soil Adjacent to Building 701 (cc mail from C Spreng to L. Brooks)*, Rocky Flats Environmental Technology Site, Golden, CO, July

20 *Corrective Action Decision/Record of Decision, Operable Unit 1 881 Hillside Area, IHSS 119 1*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, February

22 *Corrective Action Decision/Record of Decision for OU 15 Inside Building Closures*, Rocky Flats Environmental Technology Site, Golden, CO, August

22 *Final Corrective Action Decision/Record of Decision Declaration, Operable Unit 3*, Department of Energy, Rocky Flats Environmental Technology Site, Golden, CO, July

THIS TARGET SHEET REPRESENTS AN
OVER-SIZED MAP / PLATE FOR THIS DOCUMENT:
(Ref: RF/RMRS-98-269.UN)

Annual Update Historical Release Report (HRR)

(for August 1, 1997 through August 1, 1998)

Plate 1:

Individual Hazardous Substance Sites by Consolidated Operable Unit

As of September 1998

Map ID: 97-0179-IOU

September 29, 1998

CERCLA Administrative Record Document, SW-A-002770

U S DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

THIS TARGET SHEET REPRESENTS AN
OVER-SIZED MAP / PLATE FOR THIS DOCUMENT:
(Ref: RF/RMRS-98-269.UN)

Annual Update Historical Release Report (HRR)

(for August 1, 1997 through August 1, 1998)

Plate 2:

No Further Action Individual Hazardous Substance Sites and Potential Areas of Concern

(Including Proposed NFAs)
As of September 1998

Map ID: 97-0254-NFA

September 29, 1998

CERCLA Administrative Record Document, SW-A-002770

U S DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

THIS TARGET SHEET REPRESENTS AN
OVER-SIZED MAP / PLATE FOR THIS DOCUMENT:
(Ref: RF/RMRS-98-269.UN)

Annual Update Historical Release Report (HRR)

(for August 1, 1997 through August 1, 1998)

Plate 3:

Original Process Waste Lines and Associated IHSS Locations

As of September 1998

Map ID: 98-0254(97-0179-OPWL)

September 28, 1998

CERCLA Administrative Record Document, SW-A-002770

U S DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

THIS TARGET SHEET REPRESENTS AN
OVER-SIZED MAP / PLATE FOR THIS DOCUMENT:
(Ref: RF/RMRS-98-269.UN)

Annual Update Historical Release Report (HRR)

(for August 1, 1997 through August 1, 1998)

Plate 4:

Potential Areas of Concern and Under Building Contamination Sites

Map ID: 98-0254-PAC

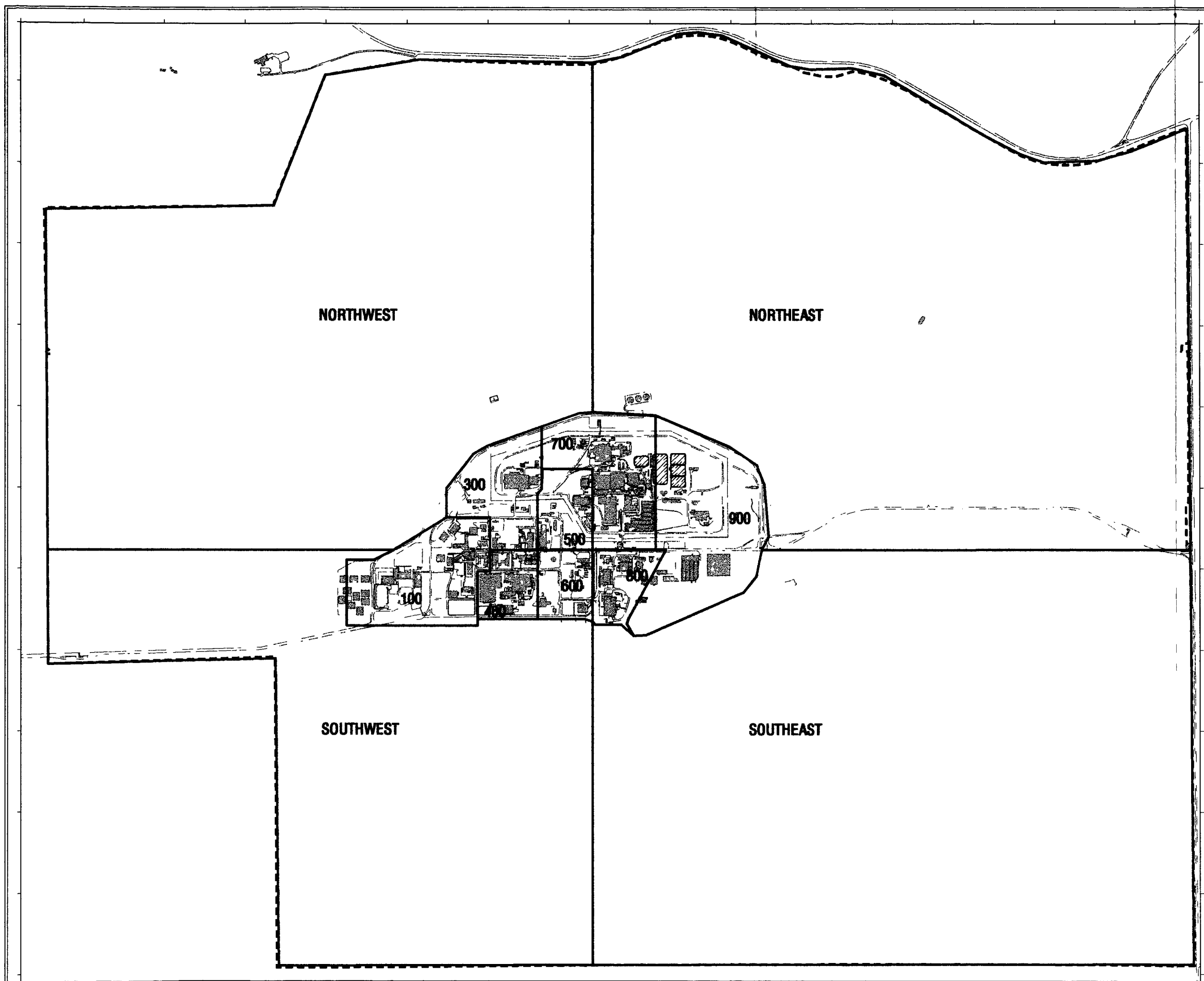
September 28, 1998

CERCLA Administrative Record Document, SW-A-002770

U S DEPARTEMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

GOLDEN, COLORADO

Figure 1-1
1998 Historical Release Report
PAC Area Boundaries



LEGEND

- Buildings & other structures
- Roads
- Rocky Flats Boundary

NOTE
PAC Areas with 000 prefix and
Offsite PAC Areas not shown

Scal 1 20450
1 inch rep sent app ximat ly 1704 feet

00 0 1000 2000ft

Stat Plane Coo di ate Pr jectio
Col edo Cent al Z
Dat m NAD27

U S Department of Energy
Rocky Flats Environmental Technology Site

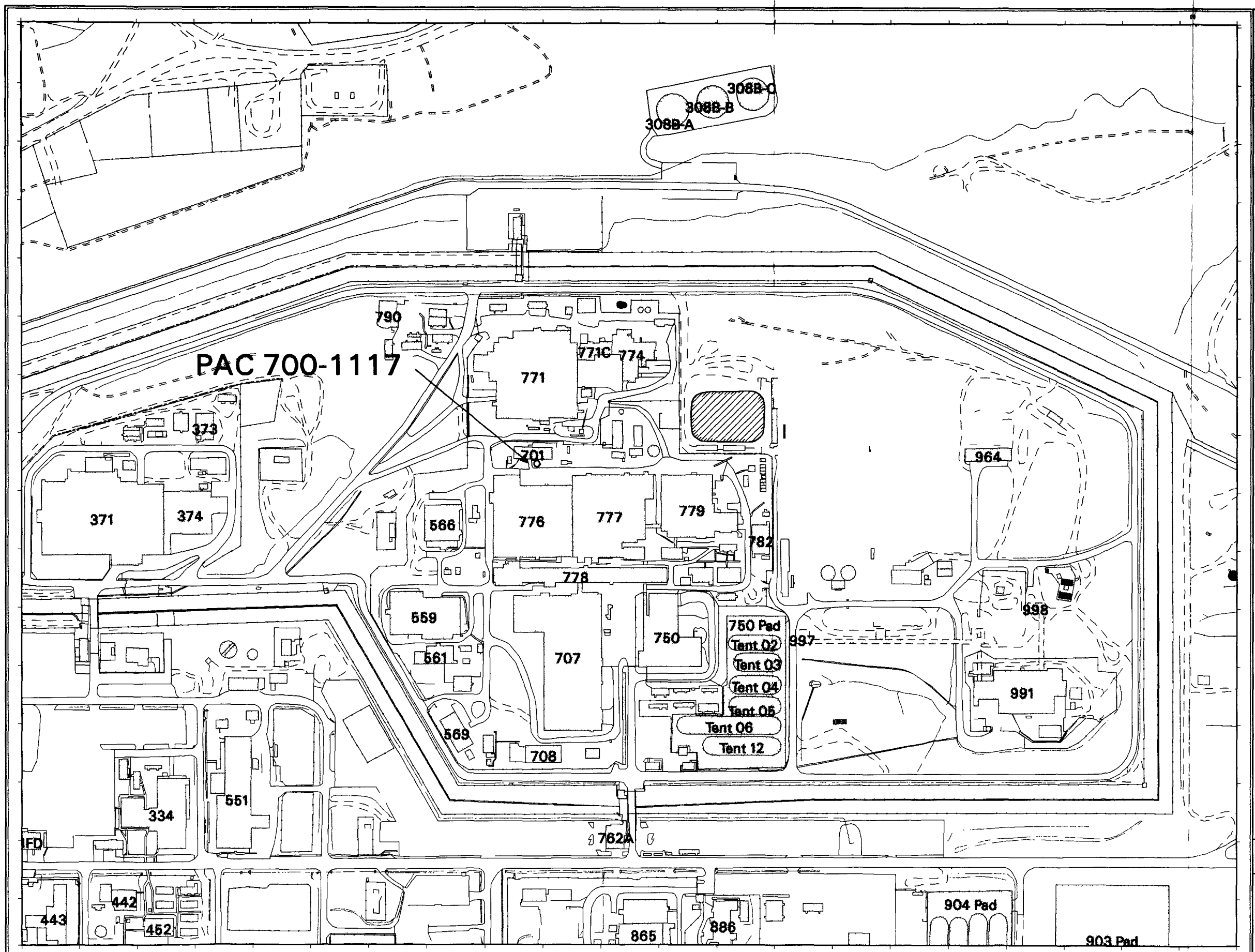
Prepared by
RMRS Rocky Mountain Remediation Services L.L.C
Geographic Information Systems Group
Rocky nviron ent ech olo Sit
Box 464
olden 80402 0464

MAP ID: 98-0241-Pac-Map14d September 18 1998

Figure 2 1

1998 Historical Release Report

Non-RFCA Generated Soils Returned to Place of Origin



EXPLANATION

Standard Map Features

- Buildings and other structures
- Solar evaporation ponds
- Lakes and ponds
- Streams ditches or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads

DATA SOURCE.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over dat captured by EG&G Rol, Las Vegas. Digitized from the orthophotographs. /9

Scale 1 4000
1 in h prese t appr ximat ly 341 feet

0 200 4

Stat Plane Coo di at Projection
Col ado Ce t al Zon
Dat m NAD27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by
RMRS Rocky Mountai Remediation Services L.L.C
Geographic Information Systems Group
Rocky Flats Environmen echnolo Ctr
Box 464
olde 402-0464

MAP ID 97-0151

September 18, 1998

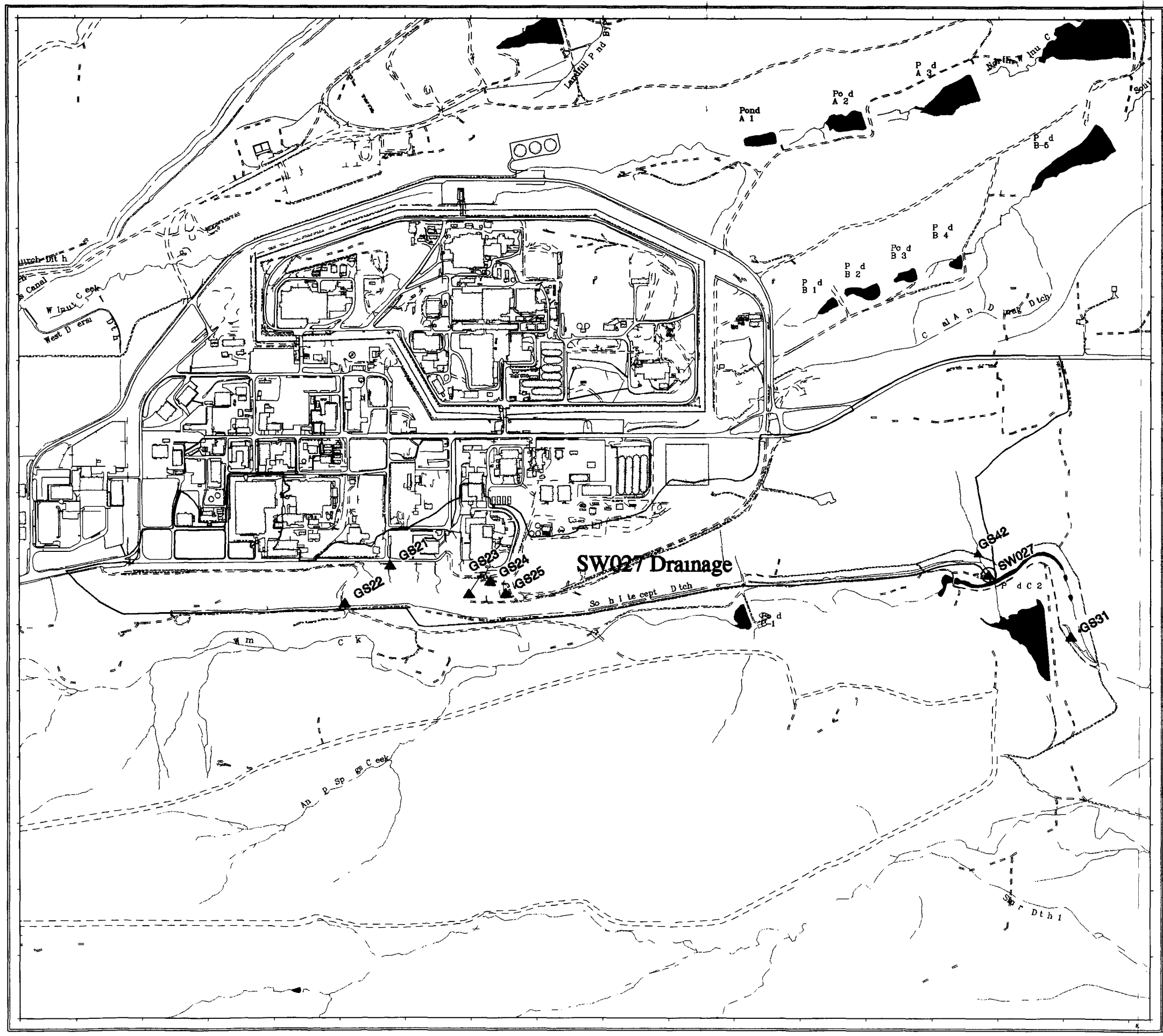


Figure 4-3

1998 Historical Release Report

Selected Surface-Water Monitoring Locations Tributary to SW027

Legend

Monitoring Location Objective*

- ▲ Point of Evaluation
- ▲ Performance
- ▲ IA IM/IRA Location
- ▲ Ad Hoc
- ○ New Source Detection

Drainage

- SW027 Drainage

Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams ditches or other drainage features
- Fences and other barriers
- Rocky Flats boundary
- Paved roads
- Dirt roads

NOTE.

The monitoring objective(s) performed at each location are detailed in the Surface Water Section of the Site Integrated Monitoring Plan.

DATA SOURCE:

Buildings, roads, and fences provided by Facilities Engr
EG&G Rocky Flats Inc. 1991
Hydrology provided by USGS (date unknown)

N

Scale 50 inch represent approximately 38 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD

U S Department f Energy
Ro ky Flat Environm nt T chnology Sit

Prepared by RMRS Rocky Mountain Remediation Services L.L.C
Geographic Information Systems Group
Rocky Flat ron m achn Site
Bo 464
old 8040 0464

A 98-034 -Map2 September 8, 1998

NORTHWEST

NORTHEAST

700

300

100

500

600

400

800

900

UBC-770
700-1108
UBC-774
UBC-771
900-1310
UBC-701
700-1100
UBC 371 &
UBC 374
700-1116
UBC - 776 &
UBC - 777
UBC-779
700-105
700-1101
UBC-778
UBC-559
UBC-707
900-1308
900-1313
900-1312
500-904
500-906
UBC-731
900-1307
NE-1407
500-907
UBC-528
UBC-991
NE-1408
700-1115
900-1301
900-1309
NE-1412
700-1106
NE-1413
100-607
UBC-331
UBC-122
UBC-123
UBC-442
600-1004
100-609
UBC-441
400-802
800-1204
800-1212
UBC-889
UBC-865
UBC-886
400-804
800-1200
UBC-125
100-603
100-611
400-803
600-1001
UBC-883
100-602
400-813
UBC-444
400-815
400-801
400-807
800-1201
UBC-447
400-810
600-1005
UBC-885
UBC-439
800-1205
400-440
UBC-887
NW-1501
NE-1409
SW-1702

Plate 4

Potential Areas of Concern and Under Building Contamination Sites

EXPLANATION

UBC-559	Under Building Contamination Potential Area of Concern
900-1310	Potential Area of Concern
NE-1406	Potential Area of Concern Point Spill

NOTE
PAC 000-500 - Sanitary Sewer System - DOE [illegible]
not illustrated or individually mapped.

Standard Map Features

- Buildings and other structures
- Solar evaporation ponds
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads
- HRR Designation Area Boundary

DATA SOURCE:
PAC's
Historical Release Report (HRR)
2nd Annual Update
Sept. 30, 1997
Individual Hazardous Substance Sites (IHSS)
DOE 1992, HRR Report and Subsequent Updates.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL/Las Vegas.
Digitized from the orthophotographs. 1/95

Scale = 1 : 3600
1 inch represents 300 feet

250 0 500 1000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:

RMRS
Rocky Mountain Remediation Services, L.L.C.
Geographic Information Systems Group
Rocky Flats Environmental Technology Site
P.O. Box 464
Golden, CO 80402-0464

MAP ID: 98-0254-PAC
September 28, 1998

Plate 3

Original Process Waste Lines and Associated IHSS Locations

(As of Sept. 1998)

126.1
126.2
215
124.1 to 124.3, 125
149.1
146.1 to 146.6
127
149.2
132
159
123.2
147.1
140
122
790
T-8
T-12
T-13
T-36
T-37
T-15
T-16
T-14
T-17
771
Solar Pond 207C
Solar Pond 207A
Solar Pond 207B North
Solar Pond 207B Central
Solar Pond 207B South
964
701
T-9
T-29
T-10
779
T-19
T-20
T-38
782
776
777
586
778
T-18
T-31
998
997
991
T-33
T-34
T-35
859
861
T-7
707
T-11
T-30
750
750 Pad
Tent 02
Tent 03
Tent 04
Tent 05
Tent 06
Tent 12
569
708
762A
373
371
374
T371C
T115A
115
111
112
331G
331FD
334
551
121
122
123
441
442
443
452
125
T-1
T-2
T-3
T-6
T-5
444
460
T-4
447
439
664
440
850
T-28
T-25
T-26
T-23
T-27
888
T-21
T-22
Tent 07
904 Pad
Tent 08
Tent 09
Tent 10
Tent 11
903 Pad
T893A
T893B
906
881F
881
T-39
T-24
T-32

EXPLANATION

- Tanks of Concern
- Foamed & Stabilized Tanks (Source Removed - Interim Status)
- Remaining Tanks
- Process Waste IHSS Locations (Former OU 9 IHSSs)
- Original Process Waste Lines
- Location of Original Process Waste Lines which may have been removed.

NOTE

[illegible]

Standard Map Features

- Buildings and other structures
- Solar evaporation ponds
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads

DATA SOURCE:

Individual Hazardous Substance Sites (IHSS) DOE 1992, HRR Report and Subsequent Updates.
The GIS Original Process Waste Lines (OPWL) were derived from AutoCAD files which were generated by IT Corporation from the OU-9 Workplan, Nov. 1992
The GIS Tanks associated with the Original Process Waste Lines (OPWL) were derived from DXF files which were generated by IT Corporation from the OU-9 Workplan, Feb. 1993.
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs. 1/95

Scale = 1 : 2400
1 inch represents 200 feet

100 0 200 400ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:

RMRS **Rocky Mountain Remediation Services, L.L.C.**
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P.O. Box 464
Golden, CO 80402-0464

MAP ID: 98-0254(97-0179-OPWL) September 28, 1998

Plate 2

No Further Action Individual Hazardous Substance Sites and Potential Areas of Concern

(Including Proposed NFAs)

(As of Sep. 1998)

NOTE:
IHSS 142.12 (Former OU-6) - "Elume Pond" at Walnut Creek and Indiana Street is NOT SHOWN on map due to map scale.

IHSS 199, 200, 201 and 202 (Operable Unit 3) East of Indiana Street are NOT SHOWN on map due to map scale.

PAC NE-1403 at East Guard Post, Building 920, is NOT SHOWN on map due to map scale.

BUFFER ZONE
EPA LEAD

INDUSTRIAL AREA
CDPHE LEAD

SOUTHWEST

SOUTHEAST

(Former Operable Units)

- Operable Unit 1 (Closed through CAD/ROD Process)
- Operable Unit 2
- Operable Unit 5
- Operable Unit 6
- Operable Unit 7
- Operable Unit 8
- Operable Unit 10
- Operable Unit 11 (Closed through CAD/ROD Process)
- Operable Unit 12
- Operable Unit 13
- Operable Unit 14
- Operable Unit 15 (Closed through CAD/ROD Process)
- Operable Unit 16 (Closed through CAD/ROD Process)
- Potential Area of Concern (Proposed as No Further Action)
- No Further Action PACs approved by Colorado Department of Health and EPA in 1992.
- Foamed & Stabilized Tanks (Source Removed - RCRA Interim Status)
- Industrial Area Operable Unit Boundary
- HRR Designation Area Boundary

Standard Map Features

- Buildings and other structures
- Solar evaporation ponds
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads

DATA SOURCE:

Loactions of the Operable Unit(s) and their associated Individual Hazardous Substance Sites (IHSS) were derived from the DOE 1992 - HRR Report and subsequent updates.
Operable Unit(s) 1, 3, 11, 15, 16 were designated to be NFA by the Corrective Action Decision/Recom of Decision (CAD/ROD), 1996
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs. 1/95

Scale = 1 : 4800
1 inch represents 400 feet

250 0 500 1000 ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy

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Golden, CO 80402-0464

MAP ID: 98-0254-NFA
September 29, 1998

Plate 1

Individual Hazardous Substance Sites by Consolidated Operable Unit

(As of Sept. 1998)

BUFFER ZONE
EPA LEAD

INDUSTRIAL AREA
CDPHE LEAD

100

400

500

600

800

900

SOUTHWEST

SOUTHEAST

GW Monitoring continues from collection well in IHSS 119.1 Operable Unit 1

Industrial Area Operable Units

- Industrial Area OU

Buffer Zone Operable Units

- Buffer Zone OU
- Operable Unit 1
- Operable Unit 5
- Operable Unit 7

Other Map Features

- Buildings and other structures
- Solar evaporation ponds
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads
- Industrial Area Operable Unit Boundary
- HRR Designation Area Boundary

DATA SOURCE:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSI., Las Vegas. Digitized from the orthophotographs. 1/95
Individual Hazardous Substance Sites (IHSS) DOE 1992, HRR Report and Subsequent Updates.

Scale = 1 : 3600
1 inch represents 300 feet

200 0 400 800ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy

Rocky Flats Environmental Technology Site

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MAP ID: 97-0179-IOU

September 29, 1998

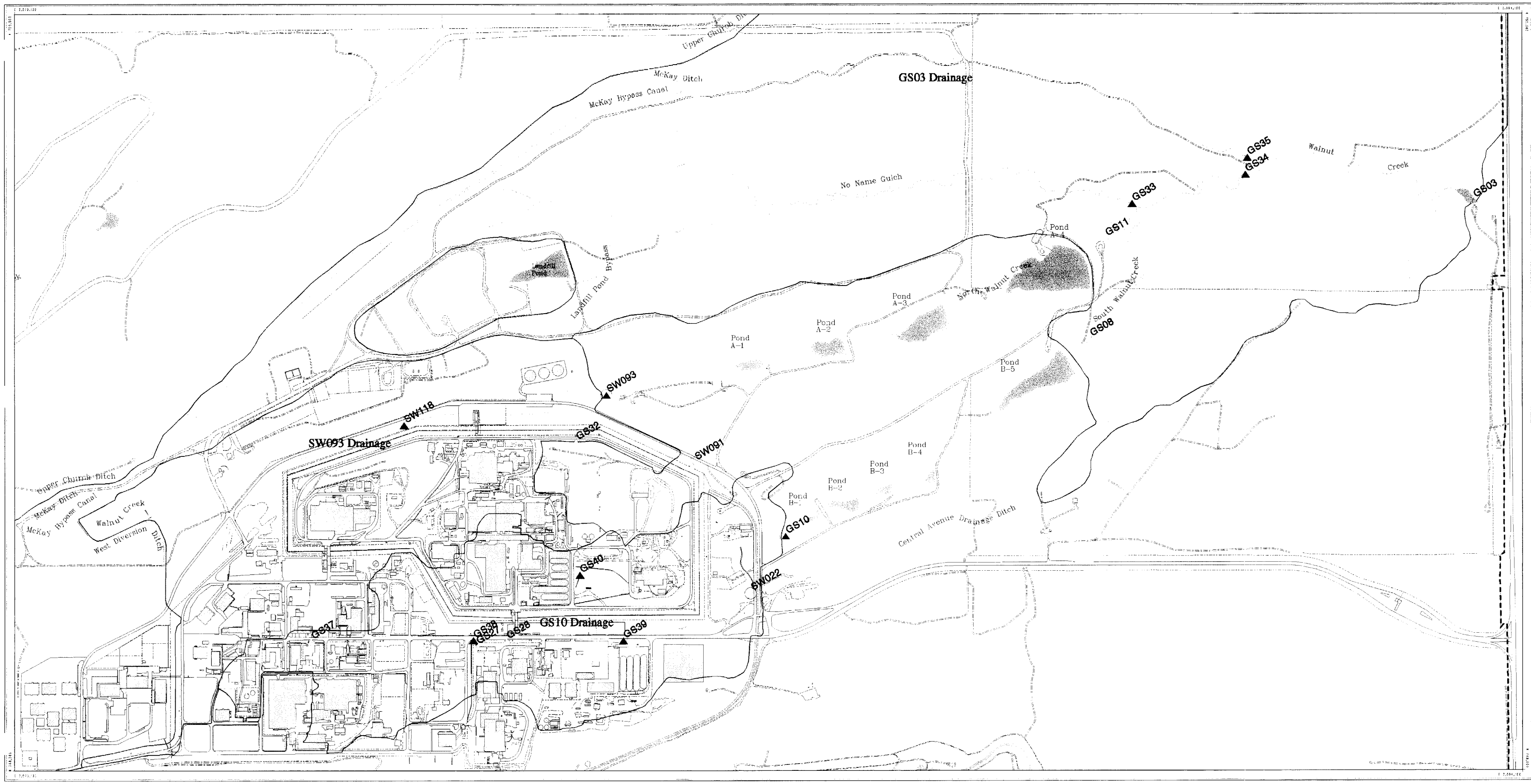

Figure 4-1

1998 Historical Release Report

Selected Surface-Water Monitoring Locations in Walnut Creek

Legend

Monitoring Locations

- Point of Compliance
- Point of Evaluation
- Performance
- Source Location
- New Source Detection

Drainages

- GS03 Drainage
- SW093 Drainage
- GS10 Drainage

Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Rocky Flats boundary
- Paved roads
- Dirt roads

DATA SOURCE:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs. 1/95

N

Scale = 1 : 8700
1 inch represents approximately 808 feet

0 400 800 1600ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:

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MAP ID: 98-0133-Map1 September 18, 1998

/gis2/projects/hydro/98-0133/mxd/walnut-sampl-fig.ami